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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXXII. No. 3257.] LONDON, OCTOBER 14, 1925. [77TH YEAR. PRICE 1s.

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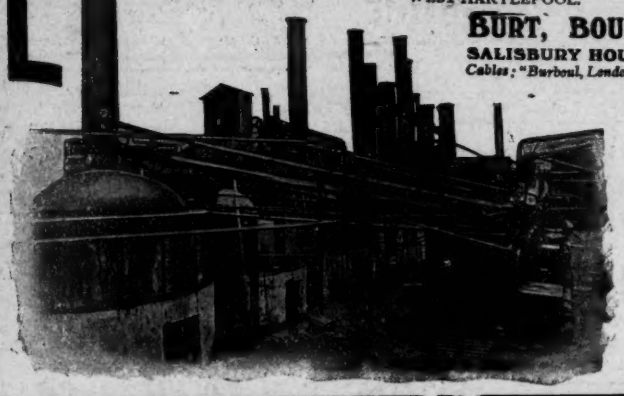

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VOL. CLXXII., No. 3257.] WEDNESDAY, OCTOBER 14 1925. [77TH YEAR.

Coke Competition Papers.

INQUIRIES have already been made regarding the publication of the principal winning papers in the Coke Competition; and we have pleasure in giving the information. It is proposed to issue on Monday, Nov. 9, a special print of the Papers—the same size as the "JOURNAL," so that it can be bound up in, and form part of, the current volume. Every subscriber to the "JOURNAL" on our books will have a copy sent free; but a number will be printed in excess which will be purchasable by anyone at 1/- each, or 1/3 by post. To enable judgment to be formed as to the number we should print in excess of that of our subscribers, it would be a convenience if orders for copies were sent early (with remittances where an account is not open in our books). It can be said that the publication will form a valuable treatise on the subject of coke production, handling, utilization, and vending; and we believe, with the Adjudicating Committee, that the work comprised in the Papers will result in new thought, ideas, and effort which will be valuably constructive in the interests of coke and of the gas industry.

EDITORIAL NOTES.

A New Interest in Coke.

EVIDENCE gathers that in gas coke a new interest is dawning among those most closely concerned, and that interest, there is full belief, will be considerably enlarged before long. And it must be if the gas industry's coke business is not to suffer further set-back, and be the victim of violent market oscillations, which are no good to the industry as gas suppliers. There was a time when gas men philosophically used to say that the price of coke must follow the coal market. Those, however, with long vision want to make coke a commodity that will be, through excellent properties, in request independent of the coal market. But, pondering for the moment not on the future but the present, there is the consideration drawn from beneath the surface that to-day the course of coal values and the demand for coke are not the only factors that assail the latter. It cannot be too strongly, or too frequently, emphasized in the gas industry that it has competition in its solid fuel markets—competition actual and threatening. When, however, the facts are considered, there is not the slightest need to be alarmed over this—providing that gas coke is intrinsically as good a fuel always and everywhere as the competitors produce, because a gas-works is situated in the very midst of what should be a sufficient market for its coke. But the fact of location will not avail the gas industry if better value in coke comes from elsewhere, and so causes the less valuable coke to be reduced in marketability. Value *plus* location is what is needed to-day.

When Dr. E. W. Smith was addressing (as reported in this issue of the "JOURNAL") the Manchester and District Junior Gas Association the other day on the production of coke for domestic purposes, he referred to the low moisture and ash content of coke-oven coke, and of the large development which is taking place in the production by coke-oven plants of free-burning, readily ignitable, solid smokeless fuel for domestic purposes. The speaker reflected that this is all to the good; but he added the view that this development should have emanated from the gas industy. It is, however, all very well to offer consolation by adding that "if all the coke ovens in existence in this country were to be turned over to the production of domestic fuel, they would not be capable of supplying more than a third of the requirements of that particular market." There is truth in this; and there is the contrary. The one and the other depend upon the connotation of the word "requirements." If "requirements" exist in possibility, good; if they refer to actual present demand for domestic purposes—well, we walk round a gas-works of which we know, and wonder why a big stock of coke has been accumulating. When gas-works managements cannot keep themselves clear of stock, they are not any the better pleased to know that along the railway lines there is—shall we say?—better quality coke travelling than is produced at some gas-works.

It is a case of opening our eyes to facts, and taking the necessary action. The time is exceptionally opportune. The conditions of the coke market during the past twelve months or so, solid fuel competition, increases in the price of gas, the fall in exports (likely to be permanent in greater or less degree), the enhanced liveliness in the question of freeing the atmosphere from impurities produced by the combustion of coal—all urge to greater action. The winning papers in the Coke Competition will be found, when published, to suggest the way to the permanent improvement of the quality and physical characteristics of coke. That is a matter for the future, but as early a future as possible. Is there, however, nothing that can be done immediately? There is, where the quality of coke is poor to-day through excessive moisture and ash, and where the simple art of grading to purpose has not yet been acquired or applied. And there is also the education of the householder in the proper utilization of coke. As Dr. Smith says, "it is of no avail to try to convert the consumer to the use of coke until and unless the coke is as good as it can be made under existing conditions of production." We see every inducement to do all this—and more as early as possible. We see no reason why the day should not come when, through education and experience of properly manufactured coke, the preference of the public will be for it rather than for smoke-producing coal. Let every gas manager ask himself what he is doing towards bringing about such a condition. He need not be afraid of over-doing good work, because we are at the point now when, with the rapid increases in gas consumption, more coke will be produced. Consider, the domestic territory which invites an acceptable smokeless fuel absorbs 38 to 40 million tons of coal per annum; while, as Dr. Smith reminds us, the total coke available for sale does not amount to more than 9 million tons, and the greater part of this is required for industrial purposes, which may not always be the case if we do not operate in defence of our own product. He computes, too, that at

the present time not more than 25 p.ct. of the gas coke available for sale is used for domestic purposes. The facts and the accumulation of coke stocks form together an accusation that all is not well in the methods of the gas industry in respect of coke production and disposal. It is an astonishing thing that, if the gas industry sold per annum 1¼ tons of their coke production to each gas consumer, there would not be of the coke available for disposal a scrap left on their hands.

One other point from Dr. Smith's paper. Coke has not a good name; and a new designation is wanted for a coke which can be, through proper physical structure, ignited just as coal is, with paper and wood—fuel which will give a good incandescence, be comparatively smokeless, and free from the objections of dust and excessive ash and fumes, and as dense as possible, so that there shall be no need for the frequent replenishment of fires. A special name should be given to such a product, which name should be a guarantee of the fuel possessing the attributes mentioned. But there would have to be an honourable obligation only to use the name for the high-class material, and not apply it to any spurious imitations or to the fuel which is now offered by some gas undertakings, and which is known as coke, and is despised—coke of high ash content, plentifully charged with moisture sold at the price of carbon, and which makes sad and miserable fires, always more ready to die than to remain in active existence. The Gas Light and Coke Company once sold low-temperature coke which they called "Carbo." The name would be quite suitable for a product possessing the good properties referred to above. However, when that or any other name is found for the higher quality material, then the public should be educated to its use, with the assurance that they would get the standard of material represented, and not something inferior. Gas men should take counsel together over all these matters. The coke question must not again be shelved.

A Coke Conference in Sheffield.

We commenced the preceding article by mentioning the new interest that is being aroused in coke. The Coke Competition has helped to create it, and will do so in still larger measure. That interest is not going to be allowed to sink. There is an intimation in Dr. Smith's paper that in November a Joint Committee of the Society of Chemical Industry, the Institution of Chemical Engineers, and the Chemical Engineering Group are going to hold a conference in Sheffield on the subject of coke, and all gas and coke-oven engineers will be invited to be present, and to take part in the proceedings. It will be remembered that, when the joint annual meeting of the Institutions named was held in Leeds in July, an item on the programme was the consideration of the winning papers in the Coke Competition—a promise having been made by the Editor of the "Journal" that if the winning papers had by that time been determined by the Adjudicating Committee, they should be available for discussion. Through various circumstances that promise could not be fulfilled. However, the publication by us of the papers on Nov. 9 will give a clear ten days before the conference for their consideration; and we believe they will bulk largely in the discussions on that occasion. We urge all gas engineers who can do so to be present.

Pioneer and Current Work in Scotland.

It was a chatty address which Mr. W. B. McLusky, of Halifax, delivered to the Scottish Junior Gas Association (Eastern District) last Saturday. The mentor was on native ground; he talked of the doings of Scotsmen in the gas industry, and the part they had taken in good service to the public. Mr. McLusky was at home; the objects of his admiration deserved all that he said. The men of Scotland have contributed well to the work of advancing the interests of the industry, both constructively and by example. He gave instances, and so recalled names which we all delight to honour. Had he so desired, he could have found many more names and deeds entitled to a place in any survey of Scotland's gas history; but there had to be limits to the address. Good advice leaps freely from the deliverance; but there are omissions which would somewhat alter certain of the features had the information been available by which to extend comparison, so making this fundamentally secure.

But in all Mr. McLusky had to say, we see the progressive and the man of modern ideas and practices; and Halifax benefits from the fact. If the address only effects one good purpose, there will be reward for the preparation and the compilation of statistics for it. It was away in 1888 that Mr. James McGilchrist, in a paper before the North British Association, made the notable pronouncement: "We have lost business through giving too little "attention to the selling of gas. . . . Had we given this "question a little of the attention that we have bestowed "on its manufacture, I am convinced that our rivals "would not have enjoyed one-half of their present popu-"larity." That was an expression of view 37 years ago. It went unheeded for years; and the gas industry continued to lose business in one direction, while gaining it in others, largely through the weakness in policy to which Mr. McGilchrist referred. It is strange how truths are by-passed and ignored by the best of us. Paisley and Dumbarton, however, occupy an honourable place in gas service by being pioneers in adopting the policy of specifying the dimensions and the mode of fixing pipes on consumers' premises, and by supplying suitable burners for all classes of consumers; and in the years long past, Paisley and Dumbarton ranked next to Glasgow in low gas prices. They then proved that good gas service did not mean high gas charges. But the lesson has been difficult to drive home—especially, Mr. McLusky declares, among the municipal authorities. Their neglect of piping and fittings in many cases is notorious. That it should be so in the case of municipalities is a matter for reflection—we almost wrote "for grave concern." Perhaps it is. The whole of their functions should be directed to the highest efficiency in public service, consistent with reasonable economy; but there is this public service in connection with gas utilization which is sadly neglected to the disadvantage of the gas consumers and the gas undertaking, and to the advantage of electrical competitors. The latter do not want gas consumers to be satisfied; it serves them better to have them dissatisfied. Gas men should make this falling-short of maximum efficiency in public service a matter for persistent attack—privately and openly until they get in the local government a sufficient number of converts to this essential policy to bring it into active being. Glasgow and other places have shown that there is no excuse for neglect; but there is much that is censurable in relation to it.

Combined with this is the question of the price of gas. Scotland in this regard has been anomalous. We look back to the days when the gas undertakings across the Border were supplying gas so rich that incomplete combustion (as testified by the condition of ceilings) was the rule rather than the exception, and yet that gas was supplied at a price which compared well with lower grade gas elsewhere. There was leisurely acceptance of the fact that a lower quality gas with which complete combustion could be assured would, even at the same prices, be an advantage to the consumers. But the change came; and it is partly due to this that Mr. McLusky can point to the fact that there are several places in Scotland in which gas is being supplied at prices which are extraordinarily close per 1000 c.ft. to those which ruled before the war. There would, however, probably be a greater difference if the prices were based upon the heating value or per therm, instead of upon volume. That is an unavoidable omission from the address, simply because comparative data are not available. Nevertheless, it must be admitted that many of the charges per 1000 c.ft. in Scotland to-day are highly creditable—particularly those from 2s. 6d. downwards to the 2s. at Uddingston, as shown in one of the tables. The calorific power of the gas has descended appreciably; but nevertheless the therm is cheap as gas prices go to-day. In comparison with other parts of the United Kingdom, Scotland has nothing of which to be ashamed in this respect.

Other lessons which Mr. McLusky emphasized as bearing upon the cost of gas are low capital charges, the

necessity for studying narrowly the question of the available coal supply, and whether a cheaper therm cannot often be supplied by the use of inferior coal which lies close at hand rather than a richer coal which involves long-distance transport and heavy railway charges. Some coals with a high ash content are good gas-makers; and, from experience, Mr. McLusky says it pays to carbonize such coal, and use the coke in the producers. The coke should be segregated for that purpose; for Mr. McLusky is as keen as any man on only the best coke being offered for sale in the local fuel market. Circumstances in these matters, of course, alter cases; and every gas management must study carefully the economics of his own position in order to supply gas at the lowest possible price. If there is no difference in the availability of coals, and long railway transport has to be faced, then the conveyance of a good gas and coke making coal will cost no more per ton than an inferior brand, nor will it cost any more for handling. But always the price at which one can supply heat units to the consumer must be the final test.

The "B.C.G.A." Annual Conference.

It may be predicted of the Annual Conference of the British Commercial Gas Association, at Plymouth, from Monday evening, Oct. 19, to Wednesday afternoon, Oct. 21, that it will reach the high standard of attractiveness to which we have become accustomed on these occasions—in fact, it will not be a surprise if, after the event, we shall be able to say more than that. There are matters current of superlative interest on the commercial side of the industry; and if there is no definite place for them in the programme, we may be sure that, at the functions or during discussions, there will be references to them. The civic authorities, with his Worship the Mayor (Alderman R. Weekes Winnicott) at their head, are extending to the Association a welcome such as the historical borough is wont to offer to all organizations which are in existence for beneficial achievement to mankind; and those who are acquainted with the spirited interest in the industry of the Chairman of the Plymouth and Stonehouse Gas Light and Coke Company (Mr. J. H. Ellis) have pre-knowledge that the meeting under his guidance as President will result in a full measure of value. With his colleagues on the Board of the Company, the President will be entertaining at dinner the members of the Association and other visitors. As to the proceedings at the sittings, the programme published elsewhere will supply an indication of the main features. Beyond these engaging matters, no doubt many will take advantage of their presence in Plymouth to visit the well-appointed showrooms of the Company; and those gas engineers who are there, and have not had an opportunity of previously inspecting the gas-works, should not fail to do so. They will find much of novelty—particularly the electrical control system which has reached a highly developed state. Those who know the Engineer and Manager (Mr. P. S. Hoyte) are aware that, when he is satisfied that a development is going to return the Company valuable service, he does not deal with it in any half-hearted manner. Those engineers who wish to go to the works should notify their desire to do so, and indicate when they may be expected. They will not regret the time expended.

The Burden of Rates.

It is high time that industry made a dead-set against the appalling extravagance of some of our local authorities which has caused rates to rise to an amount which is such a burden upon industry that its capacity in the markets is much restricted, and unemployment is thereby considerably increased. A great deal has lately been heard as to the failure of "capitalism," and, in proof, the amount of unemployment in the country is instanced. But the truth is that instead of capitalism being a failure, the policies of certain trade unions and the heavy infliction of rates are among the real causes of the dismal effects with which we are environed—unemployment being one, and the extravagance in connection with it of some boards of guardians, which makes further contribution to unemployment. We compliment the United Steel Companies and the Bigrigg and Beckermet Mining Companies upon the public protest they have made against the rates which are levied upon them, and their unconscionable infliction upon their operations. Through the non-payment of £3727 of the half-year's poor and district rates, amounting to £14,910, in respect of four Cumberland iron ore mines, the United Steel Companies were summoned at the Whitehaven Police Court. Of course, they knew full well that the magistrates could not help them; but the Company welcomed an opportunity to show the public how the rates oppressed and repressed industry. A few figures will illustrate this. In 1914, the local rates were equal to 5·8d. per ton of iron ore; while last year they were 2s. 2d., which is equal to 6s. per ton on the steel product! This big Company are forced to admit that they cannot continue to bear the burden, and at the same time pay their workmen decent wages, and compete in the world's markets.

The local spendthrifts—such as certain boards of guardians—care for none of these facts. Somebody has to pay. Who the "somebody" is or the effects do not trouble them. The heavy cost of the rate is not due to capitalism; it is due to the incapables in local government who will not recognize that there are limits to the burdens which industry can stand if they are to remain commercially stable, and that, if they are brought to a condition at which they cannot compete, then this must react upon employment. The failure of capitalism is a myth; the failure of local government to realize the reactionary influence upon industry of their extravagance is an actuality. This sort of thing bears heavily upon gas suppliers, who are usually among the largest ratepayers in a district—frequently the largest. Every gas consumer is a ratepayer. The extravagance of local bodies which unduly increases the rates means that the gas consumer indirectly pays more in rates according to the extent of his patronage of gas. Sometimes, too, it is found that when electricity concerns are the property of local authorities and the gas supplies are carried on by private enterprise, the former are favoured in respect of their assessments, and so get off lighter than would otherwise be the case. It is all unjust; and it is time that, where recklessness exists in local expenditure, it was dealt with in a conclusive manner, so relieving the individual and the industries and commercial undertakings upon which we all depend.

The influential Association of British Chambers of Commerce are moving in the matter. They are asking the Government to receive a deputation to urge the importance of a national economy campaign. The Council of the London Chamber of Commerce have also pointed out that the present burdens imposed upon industry by the imperial and local authorities are important factors in the cost of production; and, in support of the action of the Association, they express concern at the steadily diminishing ability of the country to compete in the markets of the world, and at the consequent unemployment. It is felt very strongly by them that if the vicious circle of high rates and resulting unemployment, necessitating still higher rates, is to be broken, members of the Chamber must take a more active part than in the past in local affairs, both as regards the education of public opinion and the exercise of their franchise.

A Gas Competition.

Of the making of competitions, there appears to be no end; and it is becoming almost a rage to take part in them. Some of them have good effects; others have doubtful ones. Even cross-word competitions sharpen wits, and increase one's vocabulary and knowledge—through compulsory research. Other competitions issue in general good—such as the Coke Competition, in which such considerable interest has recently been taken, and the influence of which will not quickly die down. Other competitions are for propaganda purposes. The British Commercial Gas Association have advertised one which should raise large public interest. The prizes to be distributed total to the good round sum of £1200. The first prize is £200; the second, £100; and the third, £50. There are to be ten prizes of £25 each; forty of £10 each; and forty of £5

each. The subject of the competition is "How the gas industry benefits the housewife, the artisan, the manufacturer, the city, and the nation." There need be no rush to win a prize on the part of the men of the gas industry, for in this matter they are outcasts. One of the rules says: "The competition is open to anyone resident in the British Isles, except persons engaged in the gas industry, or members of their families." However, the promoters will be forgiven their serious prohibition, for we regard this as a fine bit of propaganda if well advertised. Gas undertakings should use some of their local advertising to help to circulate information regarding it. We see the Newcastle and Gateshead Gas Company are announcing that they will give £5 to each of their consumers who wins a prize. There should be a big flutter in the Newcastle area.

A German Chemical Combine.

The British gas industry will be interested in the announcement of an enormous industrial fusion in Germany which will, it is believed, place beyond the possibility of challenge that country's dominating position in the world's markets for chemicals, drugs, and dyes. The total capital, it is reported, will be equivalent to more than £32,000,000 sterling. The Baden Aniline and Soda Factory is to absorb the other undertakings, under the style of I.G. (Interessengemeinschaft) Dye Industry Share Company. The organizers state that the objects of the amalgamation are "simplification, improvement, and cheapening." The processes of manufacture are to be concentrated in four great centres—on the Lower, Middle, and Upper Rhine, and in Central Germany. Sales are to be reorganized in groups—dyes, nitrates, drugs, destroyers of parasites, photographic chemicals, artificial silk, inorganic products, and organic intermediary products.

The Miners and the Commission.

The delegates' conference of the Miners' Federation last Friday came to the sensible conclusion not to let their dissatisfaction over the interpretation of the subvention agreement stand in the way of their appearing before the Coal Commission. The President (Mr. Herbert Smith) pointed out that the Federation was a party to the agreement entered into with the Prime Minister, which included the Commission. The Federation have insisted that by better organization many reforms can be effected in the coal industry; and, therefore, in the President's view, it is their duty to appear before the Commission to substantiate the statements the Federation have made. That is a very proper course. To have refused to appear because of a difference of opinion over a matter of interpretation of the subvention agreement would have been childish. However, the delegates also decided to press for the acceptance of the miners' reading of the agreement—that there should be no reduction of wages or increase of hours. The Minister of Labour is to be interviewed on the subject of an inquiry into the cases of workmen who are now out of employment and are deprived of unemployment benefit; and the assistance of the General Council of the Trade Union Congress is to be solicited to "enforce" the miners' interpretation of the agreement. The first public sitting of the Commission is to take place to-morrow at the Houses of Parliament.

Threats and Exports.

There was some plain speaking at the half-yearly meeting of the British Coal Exporters' Federation the other day. When coal buyers abroad read in the papers the fiery speeches of men like the Secretary of the Miners' Federation, and find there are menaces of coal stoppages, they are not so enamoured of British coal that they feel inclined to run any risks over supplies. They now simply turn their backs on Great Britain, and purchase elsewhere—generally from Germany. Since the beginning of this year the average decrease per month of coal sales abroad has been 900,000 tons up to the end of July, while in August the decrease was double that amount. The Exporters' Federation are fully persuaded that the decline in business is largely due to the stoppage threats, which have made buyers abroad chary of purchasing British coal; for the rest, price has been responsible.

"B.C.G.A." PLYMOUTH PROGRAMME.

The full programme has now been issued for the forthcoming Fourteenth Annual General Meeting and Conference of the British Commercial Gas Association, which is to take place in Plymouth, on Monday, Tuesday, and Wednesday, Oct. 19, 20, and 21, under the Presidency of Mr. J. H. Ellis, Chairman of the Plymouth and Stonehouse Gas Light and Coke Company.

ORDER OF PROCEEDINGS.

Monday, Oct. 19.

(For note as to visiting Works and Showrooms, see programme for Tuesday Afternoon.)

Reception and Lecture.

In the Guildhall, Plymouth.

8. 0 p.m. Reception by His Worship the Mayor of Plymouth, Alderman Richard Weekes Winnicott, J.P.
8.30 p.m. Lecture by Dr. C. W. Saleeby, F.R.S. (Edin.), on "Sunlight and Health."
9.15 to 10.15 p.m. Light Refreshments. Music.

Evening Dress. Decorations will be worn.

Tuesday, Oct. 20.

Morning.

Private Conference.

In the Assembly Rooms, Royal Hotel.

10. 0 a.m. Assembly of Members.
10.15 a.m. Welcome by His Worship the Mayor of Plymouth.
10.30 a.m. Presidential Address by Mr. J. H. Ellis.
Announcement of President and Auditors for ensuing year.
Presentation of the Annual Report and Statement of Accounts by the Executive Chairman, Mr. F. W. Goodenough.
Paper by:
Mr. P. S. Hoyte (Engineer and Manager, Plymouth and Stonehouse Gas Light and Coke Company), on "Housekeeping without Tears."
Discussion.
1.15 p.m. Adjournment for luncheon

Afternoon.

Official Visits.

Members will be welcome, and are cordially invited, to visit the Works and Showrooms of the Company throughout Tuesday afternoon, or at any time between 10 and 5 o'clock on Monday or after 3 o'clock on Wednesday. Those desirous of visiting the Works on Monday or Wednesday are requested to notify Mr. Hoyte, with an indication of when they may be expected.

Evening.

7.15 p.m. Reception of guests at the Royal Hotel for
7.30 p.m. Dinner by the Chairman, Mr. J. H. Ellis, and Directors of the Plymouth and Stonehouse Gas Light and Coke Company, to the President-Elect, Vice-Presidents, and members of the "B.C.G.A." and visitors.

Evening Dress. Decorations will be worn.

Wednesday, Oct. 21.

Public Conference. 10.0—12.45.

In the Assembly Rooms, Royal Hotel.

9.45 a.m. Assembly.
10. 0 a.m. Opening remarks by the President of the Conference.
"The Conservation of the Nation's Store of Solar Energy." By Prof. John W. Cobb, C.B.E., B.Sc. (Livesey Professor and Pro Vice-Chancellor of the University of Leeds).
"The Conservation of the Nation's Resources of Human Energy." By Dr. R. Veitch Clark, M.A., M.B. (Medical Officer of Health to the City of Manchester).
"The Conservation of the Nation's Vegetation." By Mr. Robert W. Ascroft, M.B.E., F.R.H.S.
Discussion.
12.45 p.m. Adjournment.
1.15 p.m. Luncheon, at the Royal Hotel, by the President-Elect, the Vice-Presidents, and members of the Association, to the President of the Association and the Directors of the Plymouth and Stonehouse Gas Light and Coke Company.

CLOSE OF CONFERENCE.

Northern Star Lodge Anniversary.

On Nov. 4 the Northern Star Lodge, No. 3033, Manchester, will be celebrating, at the Midland Hotel, Manchester, its 21st Anniversary of Consecration. After the Lodge has been opened by W. Bro. James Bridge, W.M., and the ordinary business dispatched, an Initiation Ceremony will be conducted by the Founders of the Lodge. On this auspicious occasion the Lodge hopes to be honoured by a visit from the Earl of Derby, K.G., Provincial Grand Master of East Lancashire, who was the Consecrating Officer of the Lodge.

PERSONAL.

With the close of this year, Mr. F. W. CROSS, M.Inst.C.E., Engineer and General Manager to the Lea Bridge Gas Company, will complete 30 years of service with the Company, and the Board have granted him six months' leave of absence. During this period, his son, and Chief Assistant, Mr. D. C. CROSS, Assoc.M.Inst.C.E., will act as Engineer and Works Manager, and Mr. J. D. WINSLOW as Distribution Superintendent.

At the Church of St. Peter, Eaton Square, on Oct. 7, MABEL HILDA CUTLER, only daughter of Mr. and Mrs. Samuel Cutler, of 81, Ashley Gardens, S.W. 1, was married to James Neville Marsden, son of Mrs. James Marsden, of 70 Albert Hall Mansions. The Rev. Canon Richard Blakeney officiated, assisted by the Rev. A. H. Thompson. The service was fully choral; the exquisite singing of the choir enhancing the beauty of ceremony and church. Afterwards, a reception was given at the Hyde Park Hotel.

Mr. J. E. BARLOW, who has been associated with Messrs. Hardman & Holden, Ltd., Chemical Manufacturers, Miles Platting, Manchester, for 52 years, retired from active interest in the Company on Sept. 30, but retains his position as a Director of the Company. Mr. Barlow held with distinction the position of Sales Director for a considerable number of years.

Mr. W. CHURCHMAN, the newly-appointed Gas Manager to the Dalton-in-Furness District Council, was formally welcomed to duty by the Gas Committee last week. Mr. Churchman succeeds Mr. C. T. Parkinson, to whom he was previously Assistant Manager, and who has taken up an appointment at Poulton-le-Fylde.

The Gas Committee of the County Borough of Burnley have appointed Mr. C. E. BYRT to the position of Works Assistant, which was rendered vacant by the appointment of Mr. G. Langstreth to Todmorden. For the past year Mr. Byrt has been engaged as Assistant Draughtsman. Prior to coming to Burnley, he held positions with the Colombo and Bath Companies; and he has had considerable experience in the works, drawing office, and outdoor departments, which will prove of value to him in his new position.

Mr. G. W. BROUGHTON, son of Mr. J. T. Broughton, Engineer to the Haslingden Union Gas Company, has been appointed Technical Assistant to the Herne Bay Gas Company. Mr. Broughton received his training with Messrs. S. & S. Stott & Co., Engineers, of Haslingden, and Mr. A. J. Harrison, Engineer and General Manager to the Accrington and District Gas Board.

We are informed that Mr. Thornton Ousey, Secretary of the Northern Star Lodge, No. 3053, Manchester, is suffering from a nervous breakdown. In consequence, his duties until the Installation Meeting in February next will be undertaken by Mr. M. L. WILLIAMS, of Lower Moss Lane, Hulme, Manchester.

OBITUARY.

Mr. WILLIAM MILNER, who for over fifty years was in the service of the Glasgow Corporation, died last week at the age of 67. He passed through all the grades of the Lighting Department up to the Assistant Managership. When he celebrated his jubilee three years ago, he was the recipient of a handsome presentation.

It is with regret that we have learned of the sudden death in South Africa, on July 24, of Mr. PENRITH C. CLEASBY, late of Guildford.

"EVENING STAR" GOLFING SOCIETY.

The Autumn Meeting of the "Evening Star" Golfing Society was held under ideal weather conditions at the Moor Park Club on Wednesday, Oct. 7. The morning Medal round was won by Bro. R. W. Silk with the excellent score of 90−9=81. Bros. A. R. Barford and Frank Kemp tied for second place, with scores of 95−12=83; a replay resulting in a win for the former. A Bogey competition was held in the afternoon. Bro. E. J. Fussell took first place with a card of 1 down, and Bro. Stephen Hay was second with 3 down.

W. Bro. A. E. Broadberry, after presenting the Society's prizes to the successful competitors, voiced the thanks of the members to Bro. E. G. Bartholomew for kindly providing the special prize won by Bro. Silk. He also expressed the meeting's hearty appreciation of the admirable arrangements made by W. Bro. Reg. W. Foster and Bro. E. J. Davison for the comfort and enjoyment of all.

A very hearty vote of thanks to the Chairman, W. Bro. Broadberry, ended a most enjoyable day.

ELECTRICITY SUPPLY MEMORANDA.

A COMMITTEE of the House of Commons recently decided that the charges for electricity supply must be kept distinct from charges for wiring. This is in conformity with the spirit and intention of legislation bearing on the point. The Model Clause in the case of gas provides that the gas suppliers may sell, let for hire, fix, repair, and remove apparatus, pipes, and other fittings, but, in the case of local authorities, they are so to adjust the charges made by them for any such fittings or the fixing, repairing, or removal thereof, as to meet any expenditure in connection therewith, including interest on money borrowed, and all sums applied to sinking fund for repayment. In the case of prepayment gas meter supplies and fittings, the suppliers are permitted to charge not exceeding certain additions to the ordinary price of gas, and the price they actually charge as the addition in respect of the rent of the meter and fittings is therefore known. All this has been enacted by Parliament for the express purpose of protecting the ordinary consumers who provide their own fittings. It is conceivable that a great deal of speculation could otherwise take place by local authorities supplying gas and electricity, and the charges (or part of them) for wiring and fittings could become a tax on the gas or electricity, and thus inflict an injury upon the ordinary consumers. A further sub-section of the Model Clause provides that the sum charged in respect of the provision of fittings shall be separately stated on the demand notes delivered to the consumers, and that the total sums expended and received in connection with the purposes of this section shall be separately shown in the published accounts of the undertaking. In this way, knowing the capital expenditure involved in the wiring and fittings business, it would be comparatively easy to compute whether or not it was being run on sound lines, and not giving any preferential consideration to householders who have their fittings on such terms. There have been several schemes providing wiring and fittings and current for lighting at fixed prices, with blocks of houses served in this manner; and it is a sheer impossibility for anyone outside the electricity departments to ascertain whether the prices charged are sufficient per consumer to cover the charges for wiring and fittings, and supply a balance for the current consumed which would give a revenue per unit equal to that derived from an ordinary consumer. In some of the housing schemes, too, hire rates are charged for electric cookers and other heating appliances which we are positively certain would not be equivalent to the total of the capital, sinking fund, and maintenance costs. The view of the Committee of the House of Commons, that the charges for supply must be kept distinct from any charges for wiring is one which, in our opinion, should be universally applied and insisted upon.

Distinct Charges for Wiring and Supply.

Some electrical writers take strange bases for the purpose of comparison of expenditure. They seem to prefer something that is vague; something amorphous or incapable of definite measurement. We have been reading a paragraph in the "Electrical Times" about restaurant cooking. The writer takes the number of meals served per month and by it divides the electricity consumed, and the answer is 0·315 KW.-H. per meal! But what is a meal? An august Judge has recently solemnly declared that a sandwich may be a meal. It, of course, depends upon the size of the sandwich and the degree of hunger of the person. In the same circumstances, such as the case before the Court, the sandwich might be an excuse; it might be a sufficient vehicle to override an Act of Parliament. Yet it may suffice for a meal. The same with a boiled egg. With a little bread and butter that might be a meal; so might a sausage, or a herring. We do not know the average character of a meal such as the electrical people take in making their comparisons of expenditure of electrical heat energy per person per meal. The more boiled eggs, the more sausages, or other small things that are cooked for meals, the lower comes down that average KW.-H. consumption "per meal." A "meal" is not a safe fundamental for comparison. For that purpose meals must co-ordinate in size, weight, and so on, to give us a true basis. Some restaurants supply a huge number of little meals; other restaurants a large number of good square meals. If electric energy is used, the average consumption per meal of the former would be much lower than that of the latter; and in any restaurant the larger the number of small meals, the lower would its average consumption per meal become. Our contemporary, it appears, was surprised to learn that the largest electric cooking installation for general restaurant work in the western part of the United States represents a connected load of only 125 KW. Assuming the correctness of this, he says that in Marylebone there are upwards of half-a-dozen installations as big as that, and three or four at least twice the size. The restaurant is Shay's Cafeteria, Salt Lake City; and it is asserted that the records show that in actual operation it is "the most efficient" installation in the United States. Let

Fundamentals of Comparison.

us quote what our contemporary says about this: "Some figures quoted in this connection are the preparation of about 54,000 meals per month, with a consumption of about 17,000 KW.-H.—an average of 0·315 KW.-H. per meal." And the conceited writer says: "If this is really the best efficiency that America has to show, we hardly like to mention some British figures for fear of being disbelieved." That is gloriously funny. Whoever heard of "efficiency" being based on the unknown quantity "per meal"? The average Shay's meal may be a vastly different thing from the average meal in a restaurant in this country. On this side of the Atlantic, we read, anything over about 0·25 unit per meal for general restaurant catering is on the high side, while figures as low as 0·14 and 0·15 unit per meal served are not uncommon where the equipment is a combination of steam and electric apparatus, as is the case at Shay's. Our contemporary would "like the above facts to be widely known." We are pleased to assist in their publication for the amusement of readers, and as evidence of the vague and unreliable methods of comparisons adopted by some electrical writers.

Electricity and a "Bye Product."

The electricity industry would dearly like to make a more rapid approach to the ideal operating conditions of a 100 p.ct. load factor. But they find it slow moving with cooking, heating, and hot water supply for domestic purposes. Even the supply of hot water for public baths at a shade above fuel costs does not "fill the bill" or the valleys in the curve. The writer in "Cooking and Heating Notes" in the "Electrical Times" has evolved from his cerebral mechanism the idea of utilizing, during the hours of attenuated demand, current for the production of "bye products." Why not, for example, tack on to the electricity station an electro-chemical factory? Among other things in America, attention is being directed to the electrolysis of water under high pressure for the production of oxygen and hydrogen. Conditions are said to be more favourable for this than they have ever been. If the electricity industry can produce cheap oxygen, the gas industry will be much obliged to it. Our industry is waiting for cheap oxygen to enable it to carry out, with the highest efficiency, the internal carbonization of coals in closed vessels. The higher the carbonizing efficiency, the lower the cost of gas production; the lower the production cost, the better for people who require an agent which can economically provide light, heat, and power. Therefore, by all means let the electricity industry develop the manufacture of oxygen, if the result will be a cheap supply. It will be useful to its much-hated rival.

Hydro-Electric Generation in U.S.A.

We were asked not long since if we knew the proportion of electricity that was developed by water power in the United States. We had to confess our ignorance. The "Electrical World" enlightens us. Statistics have been published by it regarding the output of electricity in the United States during the first six months of this year. The total generated was 29,104,105,000 KW.-H., as compared with 26,837,908 KW.-H.—the figure given by the "Electrical Review" in reproducing the data. There must be an omission of three noughts from the tail, as the first-named figure, it is said, shows an increase of 8·4 p.ct. The revenue increased in approximately the same proportion—to $716,400,000. Of the total energy generated, 38·4 p.ct. was by hydro-electric plant.

The Fair Sex.

In the "Daily Mail" the other day, information was given regarding the Electrical Association for Women, to which we have on two or three occasions made reference in the "Memoranda." The new organization is growing in numerical strength, and is gathering about it the interest of women of influence—particularly parliamentary. The membership is now approximately 200; and this it is hoped considerably to extend by establishing branches in the provinces. The Association have secured Lady Astor, M.P., as President; and among the Vice-Presidents are Mrs. Wilfrid Ashley, wife of the Minister of Transport, Mrs. Philipson, M.P., Miss Ellen Wilkinson, M.P., and Lady Snell, the wife of the Chairman of the Electricity Commissioners. There is no qualification for membership beyond interest in the work and ability to pay an annual subscription. Some ladies have adopted electrical engineering as a profession; and now the Institution of Electrical Engineers have nine lady members. Outside the Institution, one woman has established herself as a domestic engineer; another carries on business as an illuminating engineer.

"E.D.A." Conferences.

The programme for the Electrical Development Association Conferences from Oct. 15 to March 19 has been issued. The programme does not strike us as a very thrilling one; but titles are sometimes misleading; and anticipation is often falsified. And it is not always the paper or lecture that is the most productive; sometimes the discussions can claim to be that. It is seen that "Modern Lighting" is to have two evenings; and "Assisted Wiring Schemes" will occupy another. "Suggestions and Auto-Suggestion in Salesmanship" is to have an innings; "The Electrical Industry and the Architect" is to be discussed; and "Progress and Prospects of Commercial Electric Cooking" will receive consideration. A week before Christmas, there is to be a display of electrical films at Australia House, Strand.

Local Exhibitions.

It is noticed that recently several electrical exhibitions have been held up and down the country. The electrical people by-passed Wembley this year; and decided not to have any co-operative display anywhere for the time being. But many undertakings have used the opportunity for organizing local displays; and hardly a week now passes without accounts of fresh ones.

"Safety" Items.

The new parish church of Crosby Scunthorpe, Lincs., was the scene of the death of a young workman named Bates last Tuesday. He was setting-up an electric hand lamp when he received a shock, and was killed instantly. Recently an inquest was held at Manchester into the cause of the death of Alfred Dudley Drayson, an apprentice at the works of Messrs. Mather & Platt. He was standing near the switchboard, when he was heard to shout and fall. From the evidence, it appeared to the Coroner that what happened was that Drayson tried to keep his eyes on the switchboard meter while putting in the switches, and touched the live metal. A verdict of "Accidental death" was returned. A big case is likely to come on in California; for the California Wharf & Warehouse Company and the Balfour-Guthrie Company think they are entitled to damages to the extent of $902,592 from the Great Western Power Company, of California, for alleged negligence which caused the destruction of their warehouse and properties by fire last year. The claimants allege that the source of the fire was the transformer room in one of the warehouses. The Power Company are not inclined to accept responsibility. Several inconvenient stoppages have occurred recently on the electric rail services in and about London, either through the interruption of the supply of energy or through the breaking of wires. The mishaps interested a large number of people, who appeared to object to the delay in getting to business. They ought not to grumble in view of the sacred belief of the electrical people in the "safety" and constancy of electricity. The new power station of the Salford Corporation at Agecroft suffered a mishap on Tuesday of last week, which cut off the energy to the borough and stopped the trams.

Silly Statements.

A few weeks ago attention was called to the positively silly things concerning gas that correspondents of the "Electrical Review" are allowed to publish in its columns; and we hinted at a little more activity on the part of the editors in the interests of sane statement. Here is another gem from its "Correspondence" columns in the issue of Oct. 2. The writer was "E.O.W." In the opening passages of his letter he said: "To begin with, gas can be stored conveniently; electricity cannot. Gas should be sold at about 1s. 6d. per 1000, and still show a profit. A lot of it is carburetted water, is a deadly poison, blackens ceilings, ruins leather upholstery, burns up the air, &c., *ad infinitum.*" As the "Electrical Review" appears indisposed to delete from letters foolishness of this kind, we suggest it should put at the head of its "Correspondence" columns an intimation that the editors do not hold themselves responsible for the absurdities or extravagances of the writers of letters which in the exercise, or want of exercise, of their discretion the editors allow to be published.

Plant Ash in Relation to Inorganic Constituents of Coal.

To the October issue of "Fuel in Science and Practice," P. Haas contributes an article on the relation of plant ash to the inorganic constituents of coal. He states that too much reliance must not be placed upon the value of an ash analysis as an indication of the nature of the plant material responsible for the ash; accordingly, considerable caution should be exercised in attempting to make any deductions from the ash analysis of a coal as to the nature of the plant material from which it may have arisen. In the article in question the author indicates certain principles which may help to support or refute current theories regarding the origin of any particular coal, and may in this way help to prevent the drawing of erroneous conclusions. No mention is made in the article of the disturbing factors due to secondary ash arising from geological or other causes entirely independent of the plant material, nor is any suggestion put forward as to the possible interaction between the various ash constituents which may have occurred during the process of coal formation.

Gas Oil Price.—In their market report for Oct. 10, the "Petroleum Times" announces that from that date the price of gas oil was reduced by ¼d. per gallon, making the current price 4¾d. per gallon, net and naked, *ex* wharf.

LEEDS UNIVERSITY AND THE FUEL INDUSTRY.

New Buildings Wanted—An Appeal.

The Leeds University has a large claim upon the fuel industries of the country; and we are therefore confident that the following appeal will be received by them sympathetically, and with practical effect:

The University, Leeds, October, 1925.

Dear Sir,—The first University Department in the British Empire devoted to the study of the scientific problems of fuel was established in Leeds in 1906. From its earliest days the Department has enjoyed the confidence of the gas and fuel industries, and the recognition and generous support of its work by those industries have ensured its continuous development. Its students have received a scientific training which has proved of benefit to themselves and of invaluable service to the industries to which they have gone; and the industries have testified repeatedly to their high appreciation of the value of the research work conducted in the Department. The potentialities for the further development of its work are by no means exhausted; but, in common with the rest of the University of Leeds, it is cramped for room.

The Coal Gas and Fuel Industries Department shares with the Department of Mining a building erected in 1906 with the aid of a fund raised by the West Yorkshire Coal Owners. The building would still be sufficient and suitable for either of the Departments which occupy it, but, divided between the two, it imposes on both a barrier to further growth, and a handicap even to the full discharge of their existing work. At the time, the building was adequate for its dual purpose, but subsequent years have brought great developments of the work, especially on the side of research. The present difficulty is due to the success which has attended the efforts of the Department. The housing of equipment becomes increasingly difficult, and a very desirable extension of training in fuel to the students of other departments, particularly those of general engineering, is at present impossible. The Fuel Department cannot conveniently be moved to another site, because its experimental gas plant stands alongside the present building, which is, moreover, well adapted for the fuel work if it were wholly available. Another building should, therefore, be found for the Mining Department, but the provision of such a building should not be left wholly to the coal owners, seeing that it was chiefly through their contributions that the existing premises were secured.

It is estimated that the cost of the new building will be not less than £30,000.

The Fuel Department has received much help from the industries. Its Chair was endowed by the fund raised in 1910 as a memorial to the late Sir George Livesey. The Institution of Gas Engineers devotes large sums annually to finance an important part of the research work of the Department. The National Benzole Association also makes an annual grant for a similar purpose. In each case the research is directed by a Joint Committee, of the Institution and the University in the one case, of the National Benzole Association and the University in the other—a mode of directive co-operation between the University and industry which has proved most effective. The generosity of Mr. Henry Woodall has provided as a memorial to his father, the late Sir Corbet Woodall, an extremely valuable experimental gas plant. Several private firms have co-operated in providing parts of that plant, and other firms and individual members of the gas industry have contributed to the Department from time to time. But the work of such a Department as this is necessarily costly, and, in spite of the financial assistance given by the industries, a considerable charge falls annually upon the very limited funds of the University. The total cost of the Department in the year ended July 31 was £8285. The income from the Livesey Memorial Fund was £434, the Institution of Gas Engineers contributed £3534, and the Benzole Research Association £1197, in aid of research; the Board of Education and Leeds City Council grants were £316; and students' fees amounted to £382. The balance of cost—£2432—was met out of the general funds of the University.

The reputation of the University is enhanced by the work of this important Department, and the academic body is strengthened by the team of scientists who are engaged upon that work. It is not to be thought, therefore, that the University Authorities regret any expenditure they have been able to devote to the maintenance of the Department. But the public appeal issued by the University explains the situation with which the University is now faced, and shows why it is impossible for the University, without liberal support, to provide a remedy for the accommodation difficulty, and also to continue its annual contribution to the maintenance of the Department.

Although the time for an appeal may appear inopportune, the University is compelled by force of circumstances to seek without further delay the means to remove the defects of accommodation which so gravely hamper its work. The future of the whole University depends on the way in which this problem is overcome; and in this crisis the University turns again for help to those who have given it such great assistance in the past. Members of the gas and fuel industries will probably wish that any gifts they may see their way to make should be devoted to the Department with which they are most intimately associated. This can be done, but it is to be observed that the Department takes its character and derives its capacity for usefulness very largely from the fact that it forms a part of a University in which the various departments are working together in close co-operation and react one upon another. A student cannot qualify for a degree in gas engineering or in fuel and metallurgy without taking classes in the departments of mathematics, physics, chemistry, and engineering; and the members of the staff of the Fuel Department are greatly helped by their association with their colleagues in other departments. In short, that which affects the quality of work in the University as a whole influences the capacity for usefulness of each of its departments.

The University therefore makes a special appeal to members of the gas and fuel industries for contributions either to their own Department or to the University as a whole.

The fund required to secure adequate accommodation for the Coal Gas and Fuel Industries and Mining Departments is £30,000.

The additional income needed to supplement the present endowment of the Coal Gas and Fuel Industries Department is nearly £3000 a year.

Donations may be given in a single sum or may be spread over a period of years. Annual subscriptions promised for a period exceeding six years are exempt from income-tax and, in the case of an individual, from super-tax.

Yours sincerely,
(Signed) Devonshire,
Chancellor.

C. F. Tetley,
Chairman of the Livesey Advisory Committee.

PESSIMISM IN THE GAS INDUSTRY.

By C. A. Pelley, F.C.S.

A humourist has described a pessimist as a man who has lived with an optimist. The weak spot in the epigram is that it fails to define an optimist. I prefer the description that a pessimist is a man who, of two evils, chooses both. We have many such within the four walls of the gas industry, and the time has come when they should either imbibe an enthusiastic spirit of optimism or transfer their activities to some other sphere.

There is no room for the pessimist in our midst; there is also no reason for him. The doctrine that gas is a decadent industry, preached as it is from electrical pulpits, and inspired by uninformed jacks-in-office, has some disciples even among the elect. When domestic electricity was introduced, it was popularly believed that the days of gas were numbered. What are the facts? The strides, both in the manufacture and the utilization of gas, cannot be described as other than revolutionary, and finality is not yet even in sight. "The end of the journey lies ever beyond." I believe the day is not far distant when complete carbonization will cease to be a dream, and become a practical and beneficent reality. I am old enough to remember when the pioneers of vertical retorting were treated with good-humoured tolerance.

I am of opinion that the retort of the future will bear as little resemblance to the retort of to-day as the latter does to Murdoch's kettle. Compare the gas-fire of to-day with the crude appliance of only twenty years ago. Compare it on the grounds of efficiency, economy, and æsthetics, and then pass judgment. All reputable makers are working at high pressure, and still the demand increases.

In no department of our great industry have we stood still; and there are yet vast fields to explore. The undertaking that is not recording an increased demand for its gas, needs overhauling. I am not disputing that electricity has a definite and important part in the scheme of things; but I am satisfied that its competition, on fair lines, need prove nothing more than a healthy stimulus to further progress.

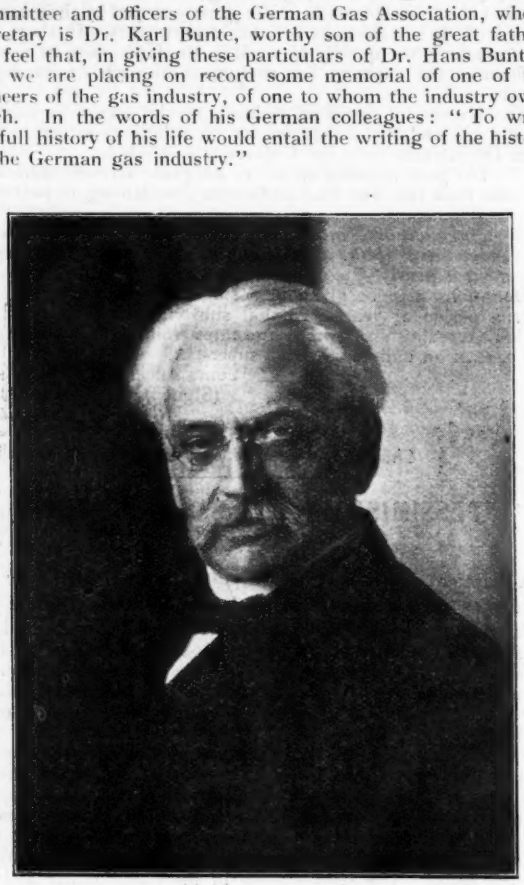
The pessimist is a menace, as his complaint is contagious. He infects his fellow-workers, and others with whom he comes in contact. Without enthusiasm in control, progress must inevitably suffer; with pessimism at the head, progress is impossible.

Wake up, ye pessimists, and view the vista with understanding eyes! The outlook is full of promise; and it is the duty and privilege of every gas official, from the highest to the lowest, to foster the application of gaseous fuel for the common weal.

Comfort in Church.—The current issue (No. 139) of "A Thousand-and-One Uses for Gas" deals with the subject of the heating of places of worship, and suggests that "an adequate and even distribution of warmth is essential in every place of worship, in the interests of the health of the congregation." It then discusses the various methods of heating, and shows by means of numerous illustrations the systems which are most satisfactorily meeting present-day needs from the point of view of efficient, healthful heating obtained at a reasonable cost.

PROFESSOR DR. HANS BUNTE.

In our issue of Aug. 26 (p. 488), we announced the lamented death of Hans Bunte, and we were then able to give only the briefest account of his life's work. This we are now able to supplement from a full notice which appeared in "Das Gas- und Wasserfach" for Sept. 26, above the signatures of the Committee and officers of the German Gas Association, whose Secretary is Dr. Karl Bunte, worthy son of the great father. We feel that, in giving these particulars of Dr. Hans Bunte's life, we are placing on record some memorial of one of the pioneers of the gas industry, of one to whom the industry owes much. In the words of his German colleagues: "To write the full history of his life would entail the writing of the history of the German gas industry."



Prof. Dr. Hans Bunte.

Hans Bunte was born, the son of a lawyer, on Dec. 25, 1848, in Wunsiedel. After his schooldays, he began his studies at the Stuttgart Polytechnic, uncertain whether chemistry or machinery attracted him more. Won over by Fehling to the former, he soon found himself drawn towards Heidelberg by the brilliant combination of Bunsen, Helmholtz, and Kirchhoff, where he worked under Erlenmeyer in Bunsen's laboratory, only to move on before long to Erlangen, in order to be near his family during the serious illness of his father. He was later offered a good post at the technical college of his birthplace—he was now Dr. Phil.—but he chose in preference an almost honorary post as assistant to his former teacher Erlenmeyer, whom he joined in Munich in 1872. It was here that he married, in 1877, Minna Stölzel. Here, also, began his acquaintance with N. H. Schilling, which was to have such an influence on his life's work.

His first application of science to technical matters was when Linde was looking for a suitable material for his first ice machine, and Bunte was able to call his attention to methyl-ether, and the manner of its preparation from sulphuric acid. The beginning of his association with the gas industry, in 1874, was largely due to Dr. Schilling, Director of the Munich Gas Company, who wanted help with his new handbook, and was anxious to gain for the German Gas Journal an improved scientific standing. Bunte replied—curiously enough, as it seems to-day—that he had never regarded the gas industry as coming within the province of chemistry, and that he did not see how he could be of any assistance. The far-sighted Schilling explained that the lack of chemists in the gas industry was one of its failings, and that the need for them was great; and it was thus that Bunte saw a new future opened for him.

In his own memoirs he has recounted how, in 1874, during the temporary absence of Dr. Schilling, the duty first devolved upon him of "seeing the paper to press"—a performance which became familiar during 42 years' service; for ten years with Schilling, and afterwards alone. The refusal of the managerships of the gas-works at Athens and Riga about this time, which were both offered to him, was a further sign that he felt that his call was for the scientific, and not for the practical, side of the industry. Among the earliest important works of the German Gas Association was a series of experiments, between 1878 and 1880, on the efficiencies of coke producers; and it was the need for a practical gas analysis apparatus in this connection that brought into being the famous Bunte burette. It is hard to realize, too, that at about the same period it was at the Munich Heat Experimental Institute, under Bunte's guidance, that for the first time any definite determination of the calorific value of coal was made, and in a calorimeter of the dimensions of a boiler! Bunte's contention that there was a definite connection between the chemical composition and the calorific value of coal led to a ten-year controversy with other eminent men, which was only finally settled in his favour towards the end of the nineties, when the Berthelot bomb was introduced into calorimetry.

The period 1882 to 1884 saw him much occupied with water gas plant, when pioneer experiments were being carried out at the English gas-works at Frankfort and at Essen. The uncertainties of the process, and the need for some of the improvements he was able to introduce, are well illustrated by the fact that in those days generator covers and valves were attached to heavy chains, to prevent their violent removal by the too frequently occurring explosions. His experiments at Munich on oven efficiencies were his first important work as General Secretary of the Association, and among the first of his achievements to obtain world-fame. They were the basis of the Munich producer oven, the forerunner in many technical details of every modern producer oven.

The next turning point in Bunte's career was his appointment to Karlsruhe, in 1887, to the Faculty of Chemical Technology. During thirty years of activity here, and the teaching which was so dear to him, a large circle of students learned to love him, both for his personal charm and for the knowledge he imparted. Never one, during this long period, but felt that he was being kept abreast, or even ahead, of the times. At the same time, Bunte's great capacity for work enabled him to retain the Editorship of the German Gas Journal, and the Secretaryship of the Association. It is impossible to detail anything of his innumerable activities during this period, but mention might be made of his personal initiative in the perfection and introduction of the Hefner lamp, his many successes in conjunction with Eitner in the field of light and illumination, and the part he played in bringing into being the International Commission on the Measurement of Light.

During Bunte's time, the Karlsruhe University grew in many directions, and did much for the gas industry. But no extension was of greater service to it, or dearer to the heart of Bunte, than the establishment there of the Gas Institute, under the auspices of the Gas Association. This experimental and research station had long been a dream of many of the leading men of the industry, and at the 1904 meeting of the Association a scheme was definitely formulated and duly endowed. The Institute was taken into use in 1907, and since then its activities have held a foremost place in the work of the Association. Whoever may have been its nominal heads, Hans Bunte always personally interested himself in directing its work. His connection with it was still further strengthened by a personal tie, when his son, Dr. Karl Bunte, was appointed head of the Institute in 1908—a position which he still holds. The conspicuous qualities of father and son have borne fruit, and in the Institute the German gas industry possesses an organization which, of its kind, is unique, and which, in its constant and active usefulness, will perpetuate, as nothing else can, the memory of Hans Bunte.

The honours conferred upon him, by the State, by Universities, by technical bodies of all kinds and nationalities, are too numerous to mention in detail. He was President of the German Gas Association in 1882-83, and for long years after Permanent General Secretary, a position from which he was able to give of his best to the industry, which he was indeed, as his colleagues ungrudgingly affirm, the very soul.

An Appreciation.

Those English gas men who had the good fortune ever to meet Hans Bunte will have a more personal regret than merely for the passing of one of the great men of the industry. His was a personality once met never forgotten, a courtliness and charm still vivid in the minds of those who last saw him when the Institution party attended the 1914 meeting in Munich.

Our industry is one in which the nations do not compete with one another for gain. It is, rather, one in which advance and discovery are welcomed and quickly shared by all, to the general profit of the industry, and, as none can deny, the benefit of humanity. Hans Bunte was one who did his full share and more, and the British gas industry will honour his memory as a great gas man. We ourselves mourn him also as a fellow worker of the technical press, and a personal friend.

W. R. K.

THE ELEMENTS OF INTERNAL COMBUSTION ENGINEERING.*

Reviewed by W. A. Tookey.

In a quiet way a considerable amount of research work has been done during the last decade by professors of engineering at various technical colleges throughout Great Britain; and though the results have been published in the proceedings of the chief engineering institutions, and elsewhere, the full effect of such researches cannot be properly appreciated until they have been collated and co-ordinated by one fully competent to do so. The thanks of many practical engineers responsible for the design and construction of internal combustion engines are due to Mr. Telford Petrie for undertaking the work and carrying it through so admirably and concisely.

Obviously the book has been prepared primarily as an educational treatise, and, as stated in the preface, the author has confined himself almost entirely to what may be termed the "paper" side of internal combustion engineering, leaving practical details to books dealing more particularly with design. Nevertheless, every practitioner should be acquainted with the latest theories formed by scientific reasoning and shaped to conform with results obtained from applied science.

Throughout the book suitable acknowledgments are paid to Sir Dugald Clerk and others for their work upon the many problems inherent in an engine which, unlike the steam engine, works with a fluid of infinite variations in physical characteristics dependent not alone upon the fuel itself or the source of the necessary oxygen to support and complete its combustion, but upon the quantity and quality of gaseous residues contaminating the fresh charges, and, what is usually of vital importance, the variation in effect produced by different pre-combustion temperatures and by the incidence of ignition timing.

The earlier chapters of the book deal with the manner in which the principal features of gas engines have evolved from the earliest designs to the latest types of gas and oil engines as constructed in 1925. It is a little curious to note that the author has fallen into the lamentably colloquial error of using the term "crude" oil when he really means a product of petroleum distillation; and he also refers to "attempts to raise compression ratios artificially by means of water injection." Such looseness in phraseology is the more remarkable as the author has throughout the work taken such pains to be commendably precise. The thermo-dynamic portions are lucid, and well summarize the present state of knowledge on this important subject. W. J. Walker's formula for the dual combustion cycle is fully dealt with in comparison with constant pressure and constant volume cycles, and the various methods of computing comparative standards of efficiency based on volume ratio and variable specific heats are discussed.

The academical platform from which the author expounds his subject is evident throughout, and not the least in the following sentence: "In order to calculate mean effective pressures, therefore, all that is necessary is to multiply the thermal efficiency by the heat received (in work units) and to divide by the working volume." This is quite true when thermal efficiency has been deduced from one of the standard formulæ for ideal engines; but to the practical engineer it seems to be "putting the cart before the horse," for thermal efficiency is calculated by him from a knowledge of mean pressures, and not *vice versa*.

Throughout the book it is noticeable that calorific values are for the most part given on the net, or lower, basis. It is now generally known that the Heat Engine Trials Committee of the Institution of Civil Engineers have recently decided that the gross calorific value is the more suitable for general adoption. Indeed, the provisional schedules presented by this Committee are worded for both gross and net, so that the change in the value of standard can be realized by those who have been in the habit of using the lower value recommended by the 1904 Committee of the Civils.

Enough has been written to show the scope of the work and the ability of the author. It is indeed gratifying to read a book on the "paper" side of the gas engine which indicates real knowledge both of the subject and the most acceptable style of presentation. Comparisons are odious, it is said, but the reviewer has much appreciated the opportunity of reading a British book which has been long overdue and which has been written by one fully acquainted with British research work and able to comment so aptly throughout upon the application of theory to British practice. The pages of questions and answers in the appendix to the book are extremely valuable—not only to the college student. With the copious index, clear illustrations, and strong binding, Mr. Telford Petrie's book is finished-off in a workmanlike manner. What is wanted now is a companion book written by someone who can as usefully and as concisely give some authoritative pronouncements based on intimate practical knowledge of engine performances in regular industrial work. The education of the gas engineer would then be well catered for.

* "The Elements of Internal Combustion Engineering," by Telford Petrie. Published by Longmans, Green, & Co. Price 10s. 6d. net.

FUEL RESEARCH BOARD.

Activities of the Past Twelve Months.

There has just been issued by H.M. Stationery Office, Adastral House, Kingsway, London, W.C., and Branches, at the price of 3s. net (postage extra), the report for the twelve months ended July 31 last of the Committee of the Privy Council for Scientific and Industrial Research. This includes the report of the Advisory Council, whose Administrative Chairman is Sir William S. M'Cormick, LL.D.

The Committee say the cost of the Fuel Research Station up to the present has been over £400,000 in capital and maintenance. "Though the production of smokeless fuel, fuel oil, light spirit, lubricants, and gas cannot yet be shown to be commercially possible by low-temperature treatment of coal, results have been obtained in other directions that have brought profit and savings to industry and the nation exceeding the total expenditure on fuel research by the Government. The new method of gas regulation by means of the therm, and the work on steaming in vertical retorts, to mention only two pieces of work done, have sufficed to produce these results. Neither of these successes was foreseen when we appointed the Fuel Research Board and decided to establish the station." They point out that the Department are also making arrangements for the intensive study at the Fuel Research Station of the problems of obtaining liquid fuels and other oils from coal under high pressures at moderate temperatures; while the basic problems of high-pressure work are included in the programme of the Chemical Laboratory at Teddington.

Advisory Council's Report.

The Advisory Committee open their report with an expression of deep regret at the death of Sir George Beilby, who was an original member of the Council, and a member of the first Executive Committee of the National Physical Laboratory. He was the first Director and Chairman of the Fuel Research Board, and the designer of H.M. Fuel Research Station. "He was," the Council say, "one of those men only too rare in this country who combine distinction in science with distinction in business. His unselfish devotion to the cause which their Lordships represent, his wisdom in counsel, his furtive generosity, and his gentle but strong nature, brought him the love and admiration of all who were fortunate enough to work beside him." Their remarks on fuel research are as follows:

In June, 1924, the Secretary for Mines urged the desirability for a more rapid expansion of the work of fuel research. We entirely agreed with this recommendation, and, as a result, additional financial provision was made in the estimates for the current financial year.

We stated in our last report that, under present conditions, the problem was "how to carry on certain work at the maximum speed compatible with obtaining full value for the expenditure, rather than how to avoid loss while keeping expenditure to a minimum." But, though the financial restrictions on the work have been removed, it must still suffer for a time from the past delays in development. There is necessarily a considerable time-lag between the formulation of plans and their materialization; and this is especially so in large-scale research, with the result that any check in the natural development has far-reaching effects on the prosecution of the work. The difficulty at the moment is to obtain suitable staff and assimilate them rapidly into the existing organization. Moreover, the erection of large-scale plant at the Fuel Research Station necessarily takes a considerable time, as also does the building of any extra accommodation required.

The personnel of the Fuel Research Board has altered much during the last five years. In 1920, Sir Richard Redmayne retired from the Board for professional reasons. In 1923, the late Sir George Beilby, to the great regret of all his colleagues and assistants, felt compelled to resign his position as Chairman and Director of Research. On his retirement he emphasized the necessity for the expansion of the work that is now sanctioned, and advised as to the steps to be taken to carry it out. We were fortunate in retaining his help and advice on this and other problems. With his advice, Sir Richard Trelfall was appointed on our recommendation to succeed him as Chairman of the Board, Dr. C. H. Lander was selected as Director of Fuel Research, and the Board was expanded to its present size.

A summary of the recent work on fuel research is given below; and a report of the Board, together with the report of the Director of Fuel Research for the period ended Dec. 31, 1924, is now in the press. The report gives a history of the Board and its work, and a full summary of the results obtained and investigations in progress.

The possibilities of low-temperature carbonization have attracted considerable public interest during the past year. The growing depression in the coal trade, the constantly increasing substitution of fuel oil for coal under boilers, and in Diesel or semi-Diesel engines in the mercantile marine, the growing appreciation of the enormous losses in the repair of buildings, in expenditure on artificial lighting, from delays in traffic, and in the health and efficiency of urban communities, due to a smoke-laden atmosphere, have all contributed to produce a

strong public opinion in favour of the earliest possible substitution of smokeless fuels for raw coal wherever this may prove possible. To those, like ourselves, who for eight years past have been pressing forward towards the solution of this urgent but difficult problem, the awakened public interest in the question is very welcome; but we recognize, and the public should realize, that it is not susceptible of a single simple answer, or, even after all the work that has already been done, of a rapid solution.

Both we and the Fuel Research Board have repeatedly pointed this out in past reports, and full reasons for this opinion have been stated. But now that the importance of the problem is widely appreciated, it is more than ever necessary to give this warning. Hasty steps and ill-considered attempts at rapid action at the cost of public funds will inevitably lead to a repetition of the past disappointments of enthusiastic private workers in this field on a still larger scale, and with far more serious effects on the prospects of what may now be described as a promising line of investigation. The national interests involved make it most desirable that all the facts, not only of the experiments of the Fuel Research Station, but so far as possible the results of private endeavours, should be made available and compared in a manner which will help to create an enlightened public judgment, and to guide private investigators along the most promising lines of advance. Accordingly, we recommended their Lordships to empower the Department to test without charge any promising full-scale plant which its owners would place at the disposal of the fuel research staff for the purpose, and to publish the results. We should explain that the Department confines its attention to the technical performance of the plant tested, and can make no attempt at estimating its commercial possibilities. No sound opinion can be formed on this aspect of the case without a prolonged trial extending over some two or three years, under scientific control, and under efficient management assisted by qualified accountants. Such trials would undoubtedly be most useful.

SUMMARY OF THE WORK OF THE BOARD.

A report of the Fuel Research Board for the period ended Dec. 31, 1924, will shortly be published, together with that of the Director of Fuel Research. This report deals with the history of the work, and gives a summary of the results obtained during the Board's existence, as well as an account of the work in progress. In view of the expansion of the work approved last year, it is proposed in future to issue an annual report on Fuel Research; and consequently it is not necessary to enter here into many details. Progress may be conveniently reported under the same headings as last year, though the divisions indicated are somewhat arbitrary.

Physical and Chemical Survey of the National Coal Resources.

The two local Committees in existence last year—viz., those for the Lancashire and Cheshire, and South Yorkshire areas—have continued their work throughout the year; and reports have been published during the year on the Arley Seam and the Ravine Seam, while the reports on the Smith Mine and the King Mine are well advanced. Negotiations for the formation of further Committees have been more protracted than was anticipated. A Committee has now been formally appointed in the North Staffordshire area; and nominations for a Committee for the Scottish area are awaited from the local coal-owners. Other Committees are expected to be formed later.

Considerable progress has been made with the difficult question of methods for the commercial sampling of coal. This work is realized to be of great importance; and the assistance of the Department has been sought in connection with difficulties that have arisen between the coal exporters in this country and foreign buyers. Mr. Sinnatt, the Assistant Director of Fuel Research, visited Sweden in March last in conjunction with representatives from the Durham Coal Owners' Association; and it is hoped that the information gained will lead to useful results.

A report on the microscopical examination of the "Lanterne" seam (South Wales) has been published. This contains ninety-two photomicrographs taken from thin sections of the coal, and shows the changes that appear in its character throughout the thickness of the seam. Expense prohibits publication of all similar reports prepared; and it is hoped that a typical example will be of interest. A list is given of seams studied in this manner, and shows where the sections and photographs are available for examination.

High-Temperature Carbonization.

During the year a report has been published on tests of a South Wales (Meiros) gas coal. A report will also shortly be published on a method of enriching the gas produced in continuous vertical gas retorts when high percentages of steam are used, by the injection of gas oil into the retort.* Studies of the phenomena connected with the working of the retorts are being continued.

A battery of full-size horizontal gas retorts is being erected at the Fuel Research Station, with a view to obtaining information as to their working, and to testing (in connection with the work of the Survey) the behaviour of coals in this class of retort.

*This report has since been issued, and was noticed on p. 37 of last week's "JOURNAL."

Low-Temperature Carbonization.

While the experiments in low-temperature carbonization on the lines of blending, briquetting under pressure at a temperature of 200° to 300° C., and then carbonizing in a simple form of cast-iron continuously working vertical retort have not been successful, and have been abandoned for the time being, it has been found possible to carbonize a suitable blend of fine coals in the retorts, without pre-briquetting. Certain simple alterations have been made to the retorts to obtain this result; and they have now been working steadily for some months, producing a good solid fuel, together with tar and gas. The labour required is small; and while the general working has been fairly satisfactory, there are still difficulties to be overcome before the process can be considered entirely successful. It is believed that an alteration in the design of the retorts, and especially of the coke-extracting gear, will obviate the difficulties; and two new retort settings have been erected. The first of these was completed in June, 1925, and the results so far are promising; but it is too early to make any definite statement.

A study of low-temperature tar is now in hand, and should result in much-needed information as to the most satisfactory methods for its treatment.

Four tests of low-temperature carbonization plant have been carried out during the year under the scheme published in August, 1924, and mentioned in the last report. These tests were on:

(1) The Parker low-temperature retorts at Barugh, Barnsley. A report has been published.
(2) The plant of the Midland Coal Products, Ltd., at Netherfield, Nottingham. A report is in the press.
(3) The "Freeman" retort of the British Oil and Fuel Conservation, Ltd., at Willesden. This test was carried out in June.
(4) The "Fusion" rotary retort of the Fusion Corporation, Ltd., installed at the works of Electro Bleach and By-products, Ltd., Cledford, Cheshire. This was carried out in July.

Power Alcohol.

The process for converting the pentosans of cellulosic materials into fermentable sugars, referred to in last year's report, was found to work satisfactorily in a semi-technical small-scale plant; but as the process necessitated acid hydrolysis under pressure, vessels constructed of acid-resisting material are necessary. Inquiries for vessels of suitable size to deal with the necessarily large quantities of material showed that such vessels are unobtainable.

In these circumstances, a modified hydrolysis process was investigated obviating the use of such vessels, and capable of being carried out in wooden tanks under atmospheric pressure. The results so far obtained have been quite satisfactory; and they are being confirmed on a large scale. At the same time, work is being continued, having for its object the increase of the proportion of acetone to ethyl alcohol in the mixture.

No further light has been thrown on the problem of the direct fermentation of cellulose; but investigations are still being continued.

Memoranda on the production of alcohol from cassava, sweet potatoes, and yams have been circulated in the Dominions, Colonies, and Protectorates. So far no suggestions have been received as to the possibilities of such production. The question of the use of these materials, combined with that of waste molasses, is, however, under investigation by the Federal Government of Australia.

The Third Memorandum on Fuel for Motor Transport was issued by the Fuel Research Board in January, 1925. It deals with the possibilities of using beets, mangolds, and Jerusalem artichokes as raw material for the production of power alcohol in this country. Various cultivation experiments are described, and statistics are appended. The conclusion is reached that it is very unlikely that any of these materials could be grown and converted into alcohol at a cost which would enable the alcohol to be used as an alternative to petrol at anything approaching its present price. Of the three materials, the Jerusalem artichoke is probably the most suitable, particularly in view of the fact that, by suitable treatment of the stalks, a pure resistant cellulose can be obtained, which would be suitable for certain purposes. Several acres of Jerusalem artichokes are being grown in different parts of the country to test-out the matter on a large scale.

Domestic Heating.

Two reports by Dr. Margaret Fishenden have been published during the year, one on the heating of rooms, and one on the domestic grate.

General.

Work has been initiated on several other important questions, but has not yet proceeded sufficiently for any progress report to be made. These include coal purification, for the study of which it is intended to erect various types of washing plant at the Fuel Research Station.

Laboratory work is being carried out on the production and use of metallurgical coke; and information is being collected on questions of furnace designs and practice.

An exhibit on somewhat the same lines as last year is being shown in the Government Pavilion at the British Empire Exhibition at Wembley.

FORTHCOMING ENGAGEMENTS.

Oct. 15.—Murdoch Lodge.—Meeting.
Oct. 16.—North of England Gas Managers' Association.—Autumn meeting at Stockton-on-Tees.
Oct. 19-21.—British Commercial Gas Association.—Annual conference and general meeting in Plymouth.
Oct. 21.—Scottish Junior Gas Association (Western District).—Visit to the Phœnix Tube Works of Messrs. Stewarts & Lloyds. Members will meet at the works at Rutherglen Bridge, Glasgow, on that evening at 7 o'clock.
Oct. 24.—Yorkshire Junior Gas Association.—Annual meeting at Leeds University, followed by tea and smoking concert.
Oct. 28.—Evening Star Lodge.—Meeting.
Oct. 30.—London and Southern District Junior Gas Association.—Meeting at the Westminster Technical Institute.
Nov. 4.—Northern Star Lodge.—Commemoration meeting.
Nov. 7.—Scottish Junior Gas Association (Eastern District).—Joint meeting with Western District, at Glasgow.
Nov. 12.—Society of British Gas Industries.—Autumn general meeting at the Hotel Cecil, under the presidency of the Rt. Hon. Sir Alfred Mond, Bart., M.P.
Nov. 18.—Southern Association of Gas Engineers and Managers.—Meeting at the Hotel Cecil, Strand, W.C. 2, at 2.15 p.m.
Nov. 25.—Evening Star Lodge.—Meeting.
Nov. 27.—Northern Star Lodge.—Regular meeting.
Dec. 5.—Scottish Junior Gas Association (Eastern District).—Visit to the Alloa Gas-Works. Paper by Mr. W. Scott.

Institution of Gas Engineers.

Nov. 10.—4 p.m., Advisory Committee on Education.
Nov. 11.—11.30 a.m., Emergency Committee. 12.15 p.m., Benevolent Fund Committee of Management. 12.45 p.m., Finance Committee.
Nov. 25.—11 a.m., Institution's session at the Public Works, Roads, and Transport Congress.
Dec. 2.—Official visit to the Shipping Engineering and Machinery Exhibition at Olympia.
Dec. 8.—4 p.m., Advisory Committee on Education.
Dec. 9.—11.30 a.m., Emergency Committee. 12.30 p.m., Finance Committee.

VOLUME, WEIGHT, AND OTHER PROPERTIES OF THE THERM.

By Norton H. Humphrys.

(*Continued from Vol. 171, p. 800.*)

A remarkable feature of the manufacture of coal gas is the variable composition of the product from hour to hour. One might reasonably suppose that the mixing attending the loading at the pit bank, transit, delivery into store, mechanical breaking, conveying into overhead hoppers, and charging into retorts, together with the dividing up into small portions, would be sufficient to convert the coal used to a smooth homogeneous condition, capable of producing a uniform quality of gas. The carbonizing conditions are under close control, and therefore should not fluctuate. Apparently there are causes, such as continually changing atmospheric temperature and pressure, which have their effect on the numerous actions and interactions intervening between the introduction of the coal into the plant and the exit of the gas produced from it. One might also suppose that variable composition of gas at the outlet of the retort would be counterbalanced by continual mixing in the condensers, purifiers, gasholders, &c., and that the quality as sent out to the district would be practically uniform. The larger the scale of operations, the greater the facility for the law of averages to take effect; but with the best control possible, the village gas-works cannot regulate the output between one hour and another to the extent of less than 4 to 5 p.ct. This diversity is especially observable in the proportion of incombustibles, to which attention is about to be directed. A practical idea respecting them cannot be attained without examination of statistics covering a number of analyses.

Consideration of this class of constituents is commonly limited to the proportion in the gas as supplied to the public, indicated by the percentage shown by analysis; but a somewhat wider view is desirable. They may either be produced from the material in the retort, or be aspirated through the walls from the exterior, in the form of air or of furnace gases. Extraneous matters cost nothing, but as much cannot be said of the direct results of destructive distillation, which for the most part escape in the form of products of internal combustion. Water and carbon dioxide, for example, take off their complement of hydrogen or carbon, which means a loss of calorific value.

A moderate quality north-country gas coal as at present supplied will contain about 78 p.ct. of carbon, 5 p.ct. of hydrogen, and 7 p.ct. of oxygen; (say) 1750 lbs. of carbon, 112 lbs. of hydrogen, and 168 lbs. of oxygen per ton as invoiced. Several researches have recently been directed to the disposal of these elements among the coke, liquids, and gas. The combustibles in a straight coal gas will include about 7 p.ct. of carbon monoxide—(say) 1000 c.ft. per ton of coal carbonized, or about 75 lbs. by weight, of which 43 lbs. would be oxygen. The remainder goes to form water and other liquids, absorbing a quantity of carbon and hydrogen. About 1000 lbs. of coke are available for sale per ton of coal, representing 167 therms. At current selling price this would bring in about 1d. per therm. About 16 therms would be lost to the gas by the formation of liquids, and the tar might realize ½d. per therm. A small quantity of hydrogen is also taken away for the formation of ammonia and sulphuretted hydrogen.

The quantities of hydrogen and carbon in the coal represent 260 and 70 therms respectively—equivalent to about 14,700 B.Th.U. per lb. Of these, we have accounted for nearly 250; the remainder includes heat needed for maintaining the temperature of the retorts, and latent heat required for conversion of solids to gaseous form. Only about one-fifth of the total calorific value of the coal is sold as gas; and there is a wide margin in the direction of conveying a larger proportion into the holders. So many wonderful operations in manufacturing chemistry are now practicable, that a yield of only 70 out of 330 therms can scarcely be called satisfactory or incapable of improvement.

An important feature in modern gas is the increase in carbon dioxide. If the purified gas contains 5 p.ct., the crude at the foul main will hold not less than 7 p.ct., as a large part is, or can be, taken out by combination with ammonia or by the solvent action of water in the washers and scrubbers. The formation of 1000 c.ft. of carbon dioxide per ton of coal means about 1 cwt. in weight, of which 30 lbs. would be carbon, and as such would show a loss of 4 to 5 therms, or (say) about 4s. per ton of coal, apart from other objections.

The incombustibles include nitrogen, oxygen, carbon dioxide, and water. Not more than 30 to 35 lbs. of the first is contained in 1 ton of coal, and 5 to 6 lbs. are removed in the purifiers and by washing. The virgin nitrogen in the gas should therefore not exceed 460 c.ft.—say, 3½ p.ct. Air purification *in situ* will probably mean an addition of 2½ p.ct. in the form of residual nitrogen, and will bring the total up to 6 p.ct. Any excess is provided by inspirated furnace gases or air; and the former may also account for part of the carbon dioxide. High proportions of both nitrogen and carbon dioxide suggest furnace gases as the source; but if the other incombustibles are in small proportion, air is probably being drawn in through leaky mouthpiece joints. The presence of more than a chance residue of about 0·2 p.ct. of free oxygen is remarkable, having regard to the large excess of combustible matter in the retort.

Table VI. shows the volume and weight of incombustibles in various descriptions of gas, representative of all kinds now supplied; and the factor peculiar to each affords material for useful study. The data for the calculations are furnished by reports of the Fuel Research Board, the Gas Investigation Committee of the Institution of Gas Engineers, one of the appendixes to a paper read by Mr. Harold E. Bloor in 1923, and a paper read by Dr. Percy E. Frankland before the Society of Chemical Industry in 1884. The first section of the table applies to steamed charges in vertical retorts. The carbon dioxide ranges from 1·85 to 5·50; oxygen, 0·15 to 0·70; nitrogen, 2·20 to 9·05; totals, 4·6 to 12·2; and the averages are 3·39, 0·41, 5·87, and 9·64 p.ct. respectively. The specific gravities range from 1·08 to 1·40, and average 1·16 p.ct.; and as oxygen is only present to the extent of about 4 p.ct., the specific gravity is determined by the relative proportions of nitrogen and carbon dioxide, of which the specific gravities are 0·97 and 1·53 respectively. The variety exhibited by Mr. Bloor's table is interesting. The prominent features are: Carbon dioxide, minimum 1·50, maximum 10·9, average 4·6; oxygen, 0·2, 1·5, and 0·6; nitrogen, 5·0, 26·3, and 10·8; totals, 8·8, 32·1, and 16·0 p.ct. The specific gravities are 1·04, 1·25, and 1·13.

Dr. Frankland shows substantially lower figures. The carbon dioxide, forty years ago, was *nil*, 2·73 and 0·52; the oxygen was *nil*, 1·0, and 0·27; the nitrogen, 2·07, 10·84, and 4·52; the totals were 2·33, 11·96, and 5·31 p.ct. In only three cases does the carbon dioxide exceed 1 p.ct.; and, with two exceptions, the nitrogen does not go over 8 p.ct.

The quality clauses in the 1920 Act were expected to mean a drastic reduction of incombustibles, and removal of complaint on the part of those who objected to pay for nitrogen or carbon dioxide at the current price of gas. The second point was effectually secured, but the answer to the first is that gas as now supplied contains 50 p.ct. more incombustibles than in 1884.

The incombustibles are sometimes spoken of as "diluents," but there are other objections to all of them. Only nitrogen can claim to be an "inert," as its companions have an influence on the working life and maintenance of the storing, distributing, and measuring plant, as explained in Institution of Gas Engineers' reports on corrosion of mains, services, and meters. A

point not to be neglected is that their specific gravities singly are 2½, 3, and nearly 4 times that of the combustibles; or as contained in the gas, nearly three times. A nominal 500 B.Th.U. gas containing 16 p.ct. of incombustibles really consists of 84 p.ct. of 600 B.Th.U. *plus* a worse than useless loading of 16 p.ct. Taking the specific gravity of the combustibles as 0·4 (in reality it is usually rather less), the addition of 16 p.ct. of gases having a specific gravity of 1·13 gives a mixture equal to 0·517. The respective square roots are in the proportion of 8 : 9; and following the rule that the distributing quality varies in inverse proportion to the square root of the specific gravity, 11 p.ct. for specific gravity must be added to the 16 p.ct. for dilution, making 27 p.ct. in all. The purifying, storing, and distributing plant required for the supply of 73 million c.ft. of the heavier gas per annum would deal with equal efficiency with 100 million c.ft. of the lighter, with a corresponding saving on the interest, upkeep, and depreciation. Distribution is sometimes said to cost practically nothing, the only working expense being a few horse-power in the exhauster house. But the overhead charges belong to a different category. The only justification for the increased costs due to purifying, storing, distributing, and measuring incombustibles is a greater economy in the manufacturing costs. But if as much is admitted, there is still the problem of reducing distribution costs without addition to expenses in other directions. The volume of the therm may be increased by the addition of incombustibles or by reducing the calorific quality of the combustibles, and is a matter of some importance, at any rate to the distributing engineer and to the consumers.

Oxygen is a supporter of combustion, and therefore differs from the other incombustibles, as not acting the part of an inert or a diluent. It simply replaces an equivalent of air, and as a rule no more than a fraction of the total requirement. One per cent. of oxygen in the gas is equivalent to 4·8 p.ct. of air; and 1·5 p.ct. (the maximum in the tables) to 7·2 p.ct. Approximately, the percentage of oxygen is equal to a similar proportion of the total air requirement.

The other incombustibles act as diluents both of the products of combustion, and also of flame temperature. The effect is illustrated by the difference when pure oxygen is substituted for air as a supporter of combustion. For low-temperature operations, such as cooking, boiling water, or melting substances that liquefy at not more than (say) 400° Fahr., a reduction of flame temperature may not be of much practical importance. For some purposes it is an advantage. But for high temperatures and for radiated heat, as for melting brass or iron, for gas fires, or for incandescent burners, the hottest possible flame is an important desideratum.

Mr. Bloor's table covers calorific values ranging from 562 to 284 B.Th.U., and the proportions of incombustibles are fairly distributed, no one quality showing decided predominance. Gases of 500 B.Th.U. contain over 16 p.ct., and some low values not more than 12 p.ct., showing that the reduction of high calorific value in the combustibles by extensive dilution with incombustibles is not in general favour.

(To be concluded.)

Table VI.—*Volume and Weight of Incombustibles.*

—	Per Cent., C.Ft.				Weight, Lbs.				Sp. Gr.
	CO_2.	O_2.	N_2.	Total	CO_2.	O_2.	N_2.	Total.	
Fuel Research Board, No. 8, Table VI.	2·00	0·70	7 85	10·55	0·228	0·059	0·589	0·876	1·08
	5·20	0·70	4·85	10·75	0·593	0·059	0·364	1·016	1·15
	2·15	0 50	6·60	9·25	0·245	0·042	0·495	0·782	1·10
	3·40	0 60	5·65	9 65	0·388	0·050	0·426	0·864	1·17
	4 20	0·40	6·25	10·85	0·479	0·034	0·469	0·982	1·18
	5·40	0·20	6·60	12·20	0·616	0·017	0·495	1·128	1·20
Do., No. 10, Table VII.	1·85	0·30	9·05	11·20	0·211	0·025	0·689	0·925	1·08
	3·85	0·15	7 35	11·35	0 439	0·013	0·551	1·003	1·16
	5·50	0·50	5 50	11·50	0 627	0·042	0·412	1·081	1·23
Transactions, Inst. Gas Engineers, 1919-20	2·10	0 20	4·50	6·80	0 239	0 017	0·337	0·593	1·13
	2 60	0·30	4 10	7·00	0·296	0·025	0·307	0·628	1·10
	2·40	..	2 20	4·60	0 279	..	0·165	0·644	1·40
Average	3·39	0·41	5·87	9·64	0·387	0·32	0·441	0·860	1·165
Average c.ft. of gas	..	..	..	..	0·0039	0·0003	0 0044	0·0086	..
Mr. Harold E. Bloor—Transactions Inst. of Gas Engineers, 1923-4, p. 558.									
Hor. C.G.	1·5	0·2	6·2	7·9	0·171	0·017	0·465	0·653	1·11
Coke Oven G.	2·0	0·8	8·1	10 9	0 228	0·067	0·607	0·902	1·08
C.G. + 25 p.ct. C.W.G.	2·2	1·3	5·3	8·8	0·251	0 109	0·395	0·755	1·10
Hor. C.G., slight C.W.G.	3·5	0·9	11·7	16·1	0·399	0·076	0 877	1·352	1·10
	5·6	1·5	9·2	16·3	0 638	0·126	0·690	1·454	1·17
C.G. and B.W.G.	3·2	0·8	8 2	12 2	0·355	0·067	0·615	1 047	1·22
Ver. Hor. Coke and B.W.G.	4 0	0·9	11·5	16·4	0·456	0·076	0·862	1·394	1·11
C.G., 25 p.ct. C.W.G.	5·3	0 5	9 0	14·8	0·604	0·042	0·675	1·321	1·16
Ver. C.G., 36 p.ct. C.W.G.	4·4	0·8	8·2	13·4	0·502	0·067	0·615	1·184	1·15
Hor. C.G. and C.W.G.	5·2	0·6	26·3	32·1	0·593	0·050	1·972	2·615	1·06
C.G. and Tully G.	6·8	0·3	9·7	16 8	0·775	0·025	0·727	1·527	1·20
C.G. & 60 p.ct. C.W.G.	6·3	0·5	5·0	11 8	0 718	0·042	0·375	1·135	1·25
,, 45 ,, ,,	10·3	0·8	15·1	26·2	1·174	0·067	1·132	2·373	1·18
C.G. and Tully G.	5·4	0·6	5·9	11·9	0·616	0·050	0·442	1·108	1·21
,, ,,	10·9	0·2	9·6	20 7	1·241	0·017	0·720	1·978	1·25
C.G.	2·3	0·3	14·3	16·9	0·262	0·025	1·072	1·359	1·04
C.G. and C.W.G.	3·7	0 9	12·0	16·6	0·422	0·076	0 900	1·398	1 10
,, ,,	3·8	0 5	15·3	19·6	0·433	0·042	1·147	1·622	1·08
,, ,,	4 2	0·9	12·6	17·7	0·479	0·076	0·945	1·500	1·12
,, ,,	4·9	0·7	11·9	17·5	0·559	0·059	0 892	1·510	1·14
,, ,,	3 8	0·7	9·9	14·4	0·433	0·059	0 742	1·234	1 06
G.W.G.	6·2	0 5	6·2	12·9	0 707	0·042	0·465	1·214	1·23
B.W.G.	5·4	0 2	6·8	12·4	0·616	0·017	0 510	1·143	1·20
G.C. and Producer G.	3·4	0·2	14·3	17·9	0·385	0·017	1·072	1·477	1·08
,, ,,	3·2	0·4	13·7	17·3	0·365	0·034	1·027	1·426	1·08
,, ,,	2·3	0·3	15·3	17·9	0·262	0·025	1·047	1·434	1·04
Average	4·6	0·6	10·8	16·0	0·525	0·053	0·811	1·389	1·13
Dr. Percy E. Frankland, 1882-4.									
Edinburgh	0·35	1·00	3·64	4·99	0·040	0·084	0·273	0·397	1·04
Glasgow	0·29	0·06	3·07	3·42	0·033	0·005	0·230	0·268	1·02
St. Andrews	2·73	0 48	2·83	6 04	0·312	0·040	0·212	0·564	1·22
Liverpool	1·70	0·19	6·10	7·99	0·094	0·016	0·456	0·666	1 09
Preston	0·84	0·25	4·79	5 88	0·096	0·021	0·359	0·476	1·05
Nottingham	0·81	0 24	2·51	3·56	0 092	0·020	0·188	0·300	1·10
Leeds	0·34	0·07	4·32	4·73	0 039	0·006	0·324	0·369	1·02
Sheffield	0·24	0·10	2·56	2·90	0 027	0·008	0·192	0·227	1·02
Birmingham	1·50	0·36	10·10	11·96	0·179	0·030	0 757	0·966	1·05
Bristol	0·00	0·27	5·11	5·38	..	0·023	0·383	0·406	0·98
London—									
Gas Light and Coke	0·00	0·26	5·95	6·21	..	0·022	0·445	0·467	0·98
S. Metropolitan	0·09	..	3·19	3·28	0·010	..	0·239	0·249	0·99
Redhill	0·74	0·49	3·37	4·60	0·084	0·041	0·253	0 378	1·08
Gloucester	0 03	0·51	2·73	3·27	0·003	0·043	0·204	0·250	1·00
Newcastle-on-Tyne	0·28	0·23	5·29	5 80	0·032	0·019	0·396	0·445	0 97
Newcastle-under-Lyme	0·08	0·11	6·22	6·41	0·009	0·009	0·466	0·484	0 98
Brighton	0·03	0·23	2·07	2·33	0·003	0 019	0·155	0 177	0·96
Southampton	0 07	0·39	2·53	2·99	0·008	0·033	0·190	0·231	1·00
Ipswich	0·06	0 12	10·84	11 02	0·007	0·010	0·813	0·830	0·98
Norwich	0·27	0 14	3 03	3·44	0·031	0·018	0·227	..	1·04
	0·52	0·27	4·52	5·31	0·059	0·023	0·338	0·421	1·03

LOW-TEMPERATURE CARBONIZATION.

During the course of a discussion upon a paper dealing with the Scottish shale oil industry, read at a meeting of the Diesel Engine Users' Association on Friday, Oct. 9, some comments were made upon low-temperature carbonization.

Prof. J. S. S. Brame did not agree with those who held the view that low-temperature carbonization would put the coal industry on its feet. The second report of the Fuel Research Board, which dealt with low-temperature carbonization, destroyed any such idea; but it was desirable to examine all possible sources of oil, with a view to obtaining home supplies.

Dr. R. Lessing said the outstanding feature was the preponderating percentage of inorganic material with which the oil-producing matter in coal was associated. He was convinced that many of the failures that attended the early endeavours to carbonize coal at low temperature, to produce a smokeless free-burning fuel and also liquid fuel, had been due to lack of understanding of the constitution of these coals, and particularly the constitution as regards the mineral constituents. It was his conviction, from experiments he had carried out, that, until coal was prepared in a state of sufficient purity, success with low-temperature carbonization could not be expected. The cleaning of coal was one of the most pressing needs of the industry to-day, in order to reduce the ash content as low as possible for the purpose of the subsequent treatment of the coal by low-temperature processes. At the same time, low-temperature carbonization could never be expected to be carried-out as an oil-producing operation alone. There must be a ready sale for the 70 p.ct. of solid residue obtained in the process. Vested interests to-day were perhaps a little too apprehensive of the competition of such processes. The gas industry, with which he had been associated for many years, seemed to-day to fear that smokeless fuel would be a serious competitor. Personally, he did not believe that anything of the kind would happen. The coking industry was entirely limited by the amount of metallurgical coke required by the iron and steel industry, and, therefore, its interests would not be affected.

New Wealth from Coal

Mr. Charles Winser, a Potteries engineer, claims to have designed an oven which will carbonize at a low temperature. It is an adaptation of a pottery oven of his invention. Its chief feature is the fact that it rotates in a series of jerks, moving the coal slack on throughout the process of drawing-off the various bye-products, such as tar, oils, and sulphate of ammonia, and capturing the gases which now run to waste. Should Mr. Winser's claim be substantiated (so the "Southampton Times" indicates), the cost of fuel in the home, and gas to run machinery for factories and for such purposes as the lighting and heating of towns, will be a fraction of their present cost, and English manufacturers will be able to compete in low prices with manufacturers abroad while paying good wages to their workers. While we are waiting for these wonders to develop, the Government experts are to investigate the Marshall-Easton process of low-temperature carbonization.

The British Tar Industry.—Giving evidence on behalf of the Association of British Chemical Manufacturers before the Committee on Industry and Trade on Oct. 5, Mr. W. J. U. Woolcock said that this country was the first to develop the production of coal tar on the large scale, and for many years was unchallenged in this field. In all countries the normal practice was for the tar products industry to operate as a separate branch of the chemical industry.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

[The Presidential Address of Mr. J. T. Haynes and a paper by Dr. E. W. Smith were features of this meeting. In the former, the President gave interesting details of the complete reconstruction scheme for the Gas Street Works, Bolton, whereby 6 million c.ft. will eventually be made on a site originally deemed too small for 1 million. He followed with much practical advice to the Junior on a works. Dr. Smith lectured on the present position and the production of domestic coke.]

On Saturday, Oct. 3, about 120 members of the Association paid a visit to the Bolton Gas-Works, where Mr. J. T. Haynes, Assoc.M.Inst.C.E., the President of the Association, is Assistant Engineer. The members assembled at the Gas Offices, and were received by the Gas Engineer, Mr. W. J. Smith, B.Sc. The Vice-Chairman of the Gas Committee, Mr. C. Beswick, offered the members a hearty welcome on behalf of the Committee.

The visitors were divided into groups under the guidance of Messrs. Haynes, Bamber, Platt, Alsop, and other officials. One party visited the Lum Street Works, and inspected the test plant and liquor plant; the others inspected the Spa Road workshops and the reconstruction in progress at the Gas Street Works.

BOLTON'S GAS SUPPLY.

Bolton is supplied by gas from two works—Gas Street and Lum Street. The annual output is 1,200,000,000 c.ft., and the maximum daily delivery about 6 millions. The storage capacity is 8 million c.ft.

The Lum Street Works, which have a capacity of 3 millions, comprise one setting of 36 Woodall-Duckham 5-ton retorts of 2 million c.ft. nominal capacity, a small unit of Tully plant, and a bench of obsolete hand-stoked horizontals. As a rule, only the vertical plant is in use. There is a waste-heat boiler attached to the vertical plant which provides over 4000 lbs. of steam per hour. Two retorts on the vertical setting can be isolated from the foul main, and coupled direct to an independent exhauster and purification plant, so that samples of coal can be thoroughly tested under normal working conditions. The test plant has a capacity of 100,000 c.ft. per day. At the Lum Street Works all the ammoniacal liquor made at the two works is concentrated to approximately 15 p.ct. NH_3, for sale. The effluent from the concentrating plant passes to the Sewage Department. The main laboratories are at this works, and extensive experiments are being carried out with a view to rendering the effluent liquor less objectionable to the Sewage Authorities.

The Gas Street Works are in course of complete reconstruction preparatory to the necessary extensions to cope with the increase in gas sales. The carbonizing plant at present consists of 24 Woodall-Duckham 7-ton retorts with a nominal capacity of 2 million c.ft. of gas per day. The exhauster and boiler plants have been completely rebuilt this year, and have just been put to work. The boiler is the largest "Lancashire" type boiler in Bolton, and the new turbo-exhausters represent the latest practice. The building to house the boilers and machinery has the special feature of being a steel structure with a large cellar to accommodate all the gas, steam, and other mains, for accessibility. New reinforced-concrete tar and liquor storage wells are in course of construction below ground, and gas cleansing plant will be erected on the roof of these wells when completed. To improve the working of the purifiers, the inlet and outlet mains have been reversed, and new meters are soon to replace the existing old station meters.

The Distribution Department is at present scattered to different points in the town, but will soon be reorganized and concentrated at the new workshops erected in Spa Road. The building is a three-storey steel structure with brick panels—a flat roof allowing for future extension. On the ground floor will be situated the fittings department and mains department offices and the fitting stores. The official meter testing station will be housed at one end of the building. On the first floor will be arranged the stove repair shops, &c., and also the fittings bulk stores, and the top floor will be laid out as a meter repair department and test room, and meter stores.

The showrooms at Hotel Street have been reconstructed, and are now a credit to the Department.

After the inspection of the works, the members adjourned to the Pack Horse Hotel for tea, at the invitation of the Gas Committee. The President, opening the meeting, introduced the Vice-Chairman and the Engineer of the Gas Department, and also the Chairman of the Electricity Department who was present. He referred to the excellent qualities of these gentlemen, and showed the happy condition under which the staff and workmen were employed. The friendly relationship between the Gas and the Electricity Departments was also instanced.

Mr. J. BRIDGE (Elland), proposing a vote of thanks to the Committee and to Mr. Smith, the Engineer and Manager, said that about seven years ago it was his good fortune to be appointed to a post at Bolton; and of the three years spent with Mr. Smith he had very happy memories. In Mr. Smith he had an ideal chief. The Gas Committee and townspeople at Bolton had every reason to be proud of their Gas Engineer.

Mr. C. E. TEASDALE (Salford) seconded the proposition; and the PRESIDENT expressed his own personal appreciation of the Committee's kindness.

Mr. BESWICK replied on behalf of the Gas Committee.

Mr. W. J. SMITH remarked that he always endeavoured to repay good service rendered by members of his staff by taking them into his confidence on matters with which they were concerned. He referred in appreciative terms to the President, who was a senior member of his staff. He also offered a welcome to Dr. E. W. Smith, of London.

PRESIDENTIAL ADDRESS.

A description of the President's own works appears to be a *sine qua non* of a presidential address; but in dealing with the reconstruction of our Gas Street Works, I shall confine myself to those items which will best illustrate my object.

In 1886, the late Mr. Smith, the then newly-appointed Gas Engineer to the Bolton Corporation, took the bold step, in the face of expert advice, of reconstructing the existing works in preference to building a new works on a new site to cope with the increasing demand for gas. Experience fully confirmed his decision, and when, 24 years later, the Gas Street Works had to be extensively modernized, the result was a 2-million c.ft. per day works arranged to take full advantage of the opportunities presented by a difficult site. The difficulties of carrying out repair work during the war, and the apparent certainty of increased gas sales at its conclusion, brought the authorities face to face with a position which can be readily understood. A scheme was drafted out and generally approved; the first step being the erection of a bench of vertical retorts adjacent to the existing horizontal retort house. It was during the construction of these retorts that I joined the Bolton Corporation; and since then, pending the completion of the scheme, I have had ample experience of a junior's difficulties on an uncompleted gas-works.

Twenty-four Woodall-Duckham 7-ton retorts were installed, with a nominal output of 2 million c.ft. of gas per 24 hours; and as the old existing plant was of 2 million c.ft. capacity, everything worked smoothly. In order to cope with the increasing demand for gas in the town, experiments were made, and the output of the retort house was increased to 2¾ millions per day—on rare occasions 3¼ millions have been made in the 24 hours—and as the cleansing plant was only of 2 million c.ft. capacity, trouble developed. The old exhausters had to be speeded-up until one machine smashed—a blade broke inside. Repairs were effected, and afterwards the exhausters were run in parallel for long periods; but it was not a comfortable feeling to have no stand-by machine.

The next outbreak came with the report of tar fog and dirty gas. One tower scrubber was permanently out of action, having been used for benzole recovery during the war; the other threw a back pressure out of proportion to the effective work done. The Livesey washer, heavily overloaded, was boiling uselessly, and there was the usual handicap on a gas-works of valves that were not gas-tight. The rotary washer scrubber, however, revolved calmly on its way, unruffled by the excitement among its neighbours, and the purifiers fortunately proved capable of taking the load. Careful watchfulness and prompt action formed the only remedy; and many excellent opportunities for initiative among the junior members of the staff were fully appreciated. Then, for some reason, the quality fell away, and another search party was organized. The ancient and much-patched annular atmospheric condensers were the trouble this time. Sling men were put to work further to patch the tubes; but when one man put his foot through a sheet of painted rust, we considered the job required other attention.

The sales of gas still increased, and the margin of spare plant dwindled, so that the question of extensions was again carefully considered. It was decided that the 1920 system was not applicable, in view of the recent experiences. The final scheme which was approved and adopted allowed for the complete reconstruction of the existing works with the exception of the vertical retorts and the purifiers. Everything else was either too small or worn out. In outline, the scheme provides for an ultimate nominal works capacity of 6 million c.ft., to be made up of three complete and independent gas-works units, intercoupled in case of emergency; and all to be constructed within the limits of scheduled land which forty years ago was considered too small for more than 1 million c.ft. per day. The existing atmospheric condensers were to be re-tubed and re-erected with the water condensers on top of the old tar wells. The tower scrubbers were to be scrapped altogether; the Livesey washer was to be enlarged and moved to a temporary position out of the way; all mains were to be above ground; and all syphon pots to have 42-in. seal, with one relief syphon of 40-in. seal on the outlet of the exhausters. Additional new underground tar and liquor storage wells would be constructed, on the roof of which would be carried the whole of the wet purification plant. The existing boilers, exhausters, and pumps, with their machinery houses, were to be demolished, and a new installation complete erected on the same site, an interesting

feature being a machinery house with three storeys. New station meters would replace the two old ones, completing the reconstruction of the first unit.

The second unit would consist of plant practically a duplicate of the first, together with the provision of a new telpher track, coke bunkers, &c., and the demolition of the old horizontal retort house to provide additional coke storage. Provision would be left for the third unit, if required in the future. Your inspection of the works this afternoon will make it unnecessary to go into any greater detail at this stage.

The question of choice of plant was an exceedingly difficult one, and provided a certain amount of interesting work on the part of the juniors, outside the ordinary excitement of routine duties. The site and accommodation available certainly precluded any thought of horizontal retorts; but after our experience with two installations of Woodall-Duckham verticals—their cleanliness, freedom from troublesome breakdowns, their elasticity, and their gratifying response to technical attention—we did not consider that the site presented any difficulties in the way of carbonizing plant. Waste-heat boilers were decided on as a natural corollary. The new atmospheric condenser tubes, as you have seen, are constructed of welded steel plates. The old tubes had in every case failed as the result of rain water collecting on the ledges formed by circular joint straps; and welding was tried, to avoid this difficulty. So far we have no reason to regret the experiment from the point of view either of efficiency or of appearance. The whole of the condensing plant has been installed with a view to its being fully sufficient for maximum possible makes of gas from vertical retorts.

The decision to adopt turbo exhausters required much more weighty consideration—*e.g.*, ground space, weight, steam consumptions, efficiency curves, effective range of load, reliability, noise, maintenance, first cost, &c.—and their performance is being watched closely. Needless to say, we felt thoroughly satisfied on every point before the decision was finally arrived at. The investigation of steam consumption threw light on the interesting problem of where all the steam goes to on a gas-works. Experiments and indicator diagrams on our existing 4-blade exhausters revealed an astounding steam consumption per B.H.P.-hour—well above the generally accepted figure for steam engine efficiency. This would indicate that there is room for economy in parts of the works other than the retort house.

The choice of turbine-driven electric generators for the power plant was based on similar investigations; and the provision of cheap steam from waste-heat boilers, together with the consideration of foundation loads relative to the site available, outweighed the benefits usually associated with gas engine driven generators. A very important factor was the saving on the whole installation, which as erected cost about half that of a complete installation with slower-moving machinery; and I think we have reason to be proud of the result.

The design of the reinforced concrete wells was the outcome of pressure of circumstances rather than the spirit of adventure. A typical design in brickwork was objected to by the Ministry of Health, on the grounds that such brickwork tended to interfere with the construction of houses; and in order to obtain the necessary borrowing powers, a concrete tank was put forward, its tightness being ensured by an independent brick lining. Profiting by experience, the tank was designed without any allowance for earth backing, and may appear to be more heavily reinforced than a water tank of the size would require; but we preferred to be sure rather than sorry. I would add at this point that the whole of the designing and estimating for this reconstruction was carried out by our own staff, and reflects credit on the junior members of the profession concerned.

The same care and attention has been given to the execution of the various works as to their design; and it may be of interest to point out to the Association some points which require particular attention on the part of those juniors who may be called upon to superintend similar work. It may sound futile to the assistant who has to watch the progress of the work to be advised to study very thoroughly the drawings—more particularly the detail drawings—as early as possible. The day when such drawings were looked at, and then locked up till the completion of the job, is often referred to; but such a practice is to be severely condemned. Every line on a drawing expresses some definite intention on the part of the designer; and its meaning should be fully understood if the work is to be correctly supervised. Great care must be taken to see that the centre lines and other main points are accurately set out and permanently fixed. It is not impossible to have the whole layout 90° wrong, and it is comparatively easy to lose marking-out pegs during an excavation. Too much stress cannot be placed on the fact that "near enough" and "just as good" will not do, particularly if contractors are to carry out the work. A method of procedure should be drawn-up and thoroughly understood before the first shovelful is thrown. If the timbering of an excavation is necessary, it should be designed to provide ample strength and to entail the minimum of cutting and wastage of material. A hole improperly or carelessly timbered may add enormously to the cost of a job, or even cause loss of life. The nature of concrete should be thoroughly understood; and I would emphasize the statement that the sand is to fill up the interstices in the aggregate, and not to provide so much volume of ballast. Carelessness in this respect may enable a contractor to save as much as one bag of cement in every four mixings. Special precautions must be taken in water or tar sodden ground; and I would suggest that a gas engineer's assistant, in such cases, if not in all, should give the contractor credit for a wide experience. Special care should be given to see that all joints are properly made, and tight. During the erection of plant, the only acceptable evidence that flange joints are properly made is to see the jointing material really squeezed out. Even then the plant should be tested under working conditions. Bolts should be fitted with grummets and washers, if the joint is to be gas-tight. Socket joints should be right home, and made without too much yarn. For some reason it seems to be exceedingly difficult to obtain a really tight steam or water main on a gas-works. Careful attention should be given to this work.

I have attempted so far to indicate some of the main points to guide juniors when engaged on what is, I think, the most instructive and interesting work they can be called upon to do. It is understood, of course, that all juniors do not have such opportunities; and I would like to encourage the others by pointing out their usefulness on a gas-works. During the process of earning the confidence of his chief, a junior will pass through the stages of watching, testing, and reporting. He will commence by watching how things are done, then he will be required to find out things for himself by testing everything within his range, from sampling coal to taking indicator diagrams, and from "dipping" the tar well to the estimation of cyanides in devil liquor in order to avoid difficulties with the local sewage authority. To confirm his reliability, he will be expected to take charge of part of the plant or undertakng, to carry some of the responsibility, and keep his chief informed of every happening actual and proposed. The interest and attention given to this work, and the practice of watching things from his chief's viewpoint as well as from his own, will determine very largely the degree of his advancement.

It may sound trite, but it is certainly true, that juniors on a gas-works are indispensable, which to my mind is all the more reason why a junior should carry out his duties efficiently and conscientiously, and make himself of greater use still. No matter how unvarying his routine duties may be, a junior can easily add interest to his work. He surely can create interest by the daily reading of water meters, tracing the consumption of water on the works, and finding reasons for its variations. Consumption of gas, lubricating oil, and other stores may be examined in the same way. What mileage does one get from carters and petrol motors? Does an Orsat analysis of crude coal gas give a ready indication of the cause of varying quality and make?

A simple costing system to indicate the costs to the undertaking of any particular duty or piece of plant profitably fills spare time. The usefulness of the figures so obtained may not be apparent, but the student forms the nucleus of a systematic mind which will assist him when he reaches a position of responsibility. Efficiencies of steam boilers, and steam engines, cost of steam per ton, &c., are interesting investigations. Make a point of taking such readings of temperature, pressure, make per hour, &c., as may on some occasion save the works superintendent having to make a tour of the works just as he wishes to go home. Any of this work may be done already by some other official; but I venture to think that if a junior uses tact and shows initiative, the chances of his being snubbed by his chief are very remote. And what if these efforts are not immediately translated into terms of £ s. d.? The junior himself will gain that experience and self-confidence which will carry him a long way to success.

I cannot let this opportunity pass without referring to the excellent opportunities and inducements to improve one's mind provided by the Institution of Gas Engineers' Education Scheme. The whole-hearted manner in which the seniors have set out to give the student of to-day advantages which were denied to themselves is deserving of the highest praise; but there is lacking in the scheme the essentially practical training which is vital to the development of the industry. This can be obtained only by the student himself making the most of the endless opportunities presented every day on the works and on the district. He can find many who are capable and willing to instruct him; and to take an interest in his work is the surest way for a junior to arouse the interest of his chief.

Statements have been made on many occasions referring to the utility of the Junior Gas Associations to the rising members of the profession; and it is my aim, particularly during the present session, to do all I can to encourage the younger members to realize the importance of the profession they have joined, and to exert themselves in the direction of being worthy of advancement, and, by preparing themselves for the future, to assist in raising the status of the whole industry.

Mr. W. H. Battersby (Junior Vice-President), proposing a vote of thanks to the President for his address, pointed out that the Asso-

ciation and the industry generally would be the better for such an inspiring paper as the one they had just heard.

Mr. W. BUCKLEY (Manchester), seconding the resolution, said that the President in his address had fully satisfied the anticipations of those who knew him best.

The PRESIDENT, in reply, stated that his work had been simplified by the ready assistance of his colleagues.

PRODUCTION OF COKE FOR DOMESTIC PURPOSES.

By Dr. E. W. SMITH, of London.

The title of this paper would indicate that coke as now made by the majority of gas undertakings is not suitable for domestic use. It is the object of this talk this afternoon to inquire into the question of what are the requisites of a satisfactory domestic fuel.

The majority of houses in this country have already existing equipment for house heating and cooking which entails the use of a solid fuel. Heat is required in the home for three specific purposes: House warming, cooking, and the production of an ample supply of hot water. There are other minor requirements, such as the heat for ironing and washing clothes.

The available fuels, irrespective of cost, convenience, æsthetics, &c., may be summarized as coal, coke, gas, oil, and electricity. Gas has made an enormous inroad into the requirements of heat for cooking; and it can be safely assumed that in districts where gas is available this form of fuel is practically universally used for cooking purposes. Gas is also being very largely employed for house heating, more especially where intermittent heating is possible. There are, however, few houses in this country in which gas is utilized as the main source of heat. The chief reason for this is its cost when used continuously. The normal prejudice of the housewife would rapidly be overcome if the price of gas could be sufficiently reduced. This, however, in by far the majority of cases, is not within the realm of immediate practicability.

For various reasons the householder will continue to use for a long time solid fuel as the means of obtaining general heat and a plentiful supply of hot water. It may be asked what is the matter with coal, and why any attempt should be made to change already existing methods. To those engaged in the gas industry there are two primary reasons why the householder should be educated to employ the solid residue from the high-temperature distillation of coal. I hesitate to call it coke in this connection, because some word will have to be coined to distinguish a really satisfactory solid smokeless fuel from that which is known as coke at the present day. A satisfactory solid fuel must be easily ignitible, and be capable of being lighted with paper and chips as readily as coal. It must also give an incandescent glow pleasing to those who are using it. It must be comparatively smokeless, and free from objections due to dust, lifelessness, and fumes. It must also be, consistent with satisfactory combustibility, as dense as possible, in order that the replenishment of the fires shall be no more frequent than is absolutely necessary.

But what is the matter with coal? It is accepted that by far the greater proportion of the smoke nuisance comes from the domestic use of raw coal. It has also been established that coal cannot be used as efficiently, either in the open grate or in the central heating boiler, as coke. It is also accepted that it is an unnecessary and wasteful use of the volatile matter in raw coal to burn it directly in the open fire or in any other way. There is full justification, therefore, for the demand that raw coal shall no longer be used for domestic purposes.

The two reasons why the householder should be educated to the use of an improved coke are:

However much gas may be used either domestically or in industry, there will be a make of coke available for sale which will vary in quantity with the production of gas. In general terms this is true. One will consider less and less as time goes on the process of complete gasification as the sole source of gas on any given works. The calorific value is too low, and specific gravity too high, to justify the expense entailed in its distribution. This is in passing. It would appear, therefore, that, as the cost of gas, and consequently its selling price, depends largely on the price obtained for coke, it would be of advantage to the gas undertaking to pay as much attention to coke production and coke sales as to any other part of their business. This is the first of the two reasons I mentioned:

The second is that coke is, or should be, a smokeless fuel; and it is of national importance that the domestic smoke evil should be eradicated. Mr. E. D. Simon, in his book on this subject, graphically explains the effect of the smoke nuisance on national expenditure in connection with laundry bills, &c. He also shows that the filtering effect on the health-giving sun's rays caused by the pall of smoke which hangs over most of our cities is more prejudicial to the general health of the community than is often realized. If the gas industry can produce a really satisfactory free-burning smokeless fuel, the demand for such a fuel would be so great that a good average financial return to the gas undertaking would be assured, which would have the effect of reducing the price of gas.

At the present time between 38 and 40 million tons of coal are used annually in the domestic grate. The total coke available for sale does not amount to more than 9 million tons, and most of this is required for industrial purposes. It will be agreed that if the demand for coke were to be increased by (say) 25 p.ct., or an extra 2 million tons a year, the level of prices for coke over the whole year would be immediately raised. This 2,000,000 tons would only provide just over 6 p.ct. of the nation's requirements for domestic fuel; and it is conceivable that gas undertakings will most truly revert more generally to the old appellation of gas light and *coke* companies, and actually produce coke eventually as their main product, in a manner similar to coke oven concerns, but with the added advantage of already existing facilities and rights for disposing of gas.

Up to recent years coke oven concerns have been almost solely engaged in producing blast-furnace and foundry coke. Their "smalls" have been used for other industrial purposes. With the slump in the steel trade, coke ovens have been forced to find other outlets for their products, and they are now entering the field previously monopolized by gas undertakings for the sale of coke. They start with a definite advantage. They are usually confined to one coal. Frequently the coal is washed, and the resultant coke, apart from its ignitibility, is, from every other point of view, to be preferred to the usual gas-works coke.

The primary advantage of coke-oven coke is that it is usually low in moisture; and this, combined with its low ash content, is an attraction to the intelligent buyer of solid fuel. But the coke oven undertakings are not satisfied with this. A great deal of development is taking place in connection with the production of free-burning, readily ignitible, solid smokeless fuel in coke ovens. This is all to the good. This development cannot help but be reflected in the gas industry; but I have a feeling, rightly or wrongly, that such development should have emanated from the gas industry.

The competition of the coke oven industry cannot do any harm. If all coke ovens in existence in this country were to be turned over to the production of domestic fuel, they would not be capable of supplying more than a third of the requirements of that particular market, and it is inconceivable that such a state of things should ever come about, dissociated from gas undertakings, as the requirements of the steel industry will have to be met.

It was the intention that this meeting should be used for an informal discussion of the winning papers in the Coke Competition organized by the "GAS JOURNAL." Unfortunately the results of that competition are not yet known, and the papers have not been published. As this meeting could not be postponed, it was decided that I should open a discussion on this subject. I cannot too strongly urge on all gas engineers the supreme importance of this question in connection with the present economics of the gas industry and its future development.

Now what can be done in this matter? In the first place, a great improvement can be made by the simple means of efficient quenching, suitable grading or screening, and a wholesale campaign for the education of the consumer. These factors should be distinctly taken in this order. It is of no avail to try to convert the consumer to the use of coke until and unless the coke is as good as it can be made under existing conditions of production. No coke sold should ever contain more than 5 p.ct. of moisture, and no coke should ever be sold for domestic purposes unless it has been sized and screened. I am not asking for impossibilities, because it is a fact that in many districts, where there is a strict control on the production and preparation of coke, the whole of the coke made is now being readily sold at prices which have the effect of reducing the selling price of gas.

While on this subject, I should like to say a few words on the problem of low-temperature carbonization. I am of the opinion that no process for the low-temperature carbonization of coal has the slightest prospect of financial success unless worked as part of the operations of the gas industry; and so far I have had no convincing information which would lead me to suppose that there is as yet any system for the low-temperature carbonization of coal in which gas can be made as cheaply as from high-temperature processes. I think you will agree that this is the sole factor of importance. Can the low-temperature process provide gaseous therms for the gas industry at a lower cost than the best of already existing high-temperature methods employed by the gas industry? If it cannot, then such processes are of little interest to it.

During November a Joint Committee of the Society of Chemical Industry, the Institution of Chemical Engineers, and the Chemical Engineering Group will be holding a conference in Sheffield on this subject. All interested, whether in the gas industry or the coke oven industry, will be invited to be present. Demonstrations will be given of the use of coke and special patent fuels for various domestic purposes. It is to be hoped that all gas engineers who can attend will do so.

In conclusion, I wish informally to give you a general account of some of the work with which I have been connected in recent years in an endeavour to produce a high-temperature solid smokeless fuel at an attractive price, and equal to the best that has been made by any other process. I should also like to say something to you in criticism of a number of well-known low-temperature plants.

After doing so, Dr. Smith resumed: From what I have said, you will appreciate that a great deal can be done in the direction of improving the solid residue from the high-temperature distillation of coal by a better selection of coal, and by methods of blending. The first thing, however, for the gas industry to do more generally is to keep-down the water content of coke, and to screen the coke to suitable sizes. No existing low-temperature process has as yet any attraction for the gas industry.

We require to have for our aim the creation of such a state of things as will make the gas industry the sole providers of fuel for domestic purposes and for industry. This can be done by research and improved organization. In my view, it is immediate practical politics; and the sooner this becomes the general aim, the sooner will that happy state of things both nationally and for the industry come about.

Mr. R. B. Glover (Manchester) proposed, and Mr. Applebee seconded, a vote of thanks to Dr. Smith for his paper.

BRITISH STANDARD SPECIFICATION FOR PORTLAND CEMENT.

The British Engineering Standards Association have now published a new issue of the B.S. Specification for Portland Cement (No. 12—1925) which was last revised in 1920. Since that time it has been found desirable to make certain changes to bring it more into line with present-day requirements and to meet prevailing conditions of manufacture and testing in hot climates. In the course of the work of revision, a more precise method was sought than that heretofore adopted for determining the consistency of the neat cement paste for the tensile and setting-time tests. Extensive investigations were carried out, but no method was found which could be considered unquestionably more reliable; and the directions of the previous editions of the B.S. Specification have therefore been retained. The investigations are being continued in the hope that some satisfactory means may be found which can be included in a future edition of this Specification.

The following are the principal alterations embodied in the 1925 edition of the Specification:

(1) A summary of the tests is given at the beginning of the Specification.

(2) Provision has been made for testing in hot countries at temperatures up to 95° Fahr. In climates where the temperature runs above 95° or below 58° Fahr. special arrangements have to be made between the vendor and the purchaser, unless the ranges given in the Specification can be artificially produced.

(3) The cement is now required to be more finely ground; the permissible residue on a 180 × 180 sieve being 10 p.ct., instead of 14 p.ct. Tolerances are laid down for the number and size of wires and size of openings in sieves both for cement and for sand. The minimum size of the sieving area is now specified to be 50 sq. in., and the minimum depth of the sieves $2\frac{3}{4}$ in.

(4) The maximum figure for the hydraulic modulus has been raised to 2·90, and the maximum limit for magnesia is now 4 p.ct.

(5) The minimum tensile breaking strength of neat cement after 7 days has been increased to 600 lbs. per sq. in., and that of cement and sand after 7 days to 325 lbs. per sq. in. The 28-day test on neat cement has been eliminated.

(6) The amount of water for gauging cement and sand briquettes is now to be ascertained by means of a formula based upon the amount needed to produce the plastic mixture required in the tensile test for neat cement.

(7) The Standard Leighton Buzzard sand is required to be of the white variety, and its loss of weight on extraction with hot hydrochloric acid is specified not to exceed 0·25 p.ct.

(8) The initial setting time of normal setting cement is to be not less than 30 minutes, and the initial setting time of quick-setting cement not less than 5 minutes.

Copies of this publication (No. 12—1925) can be obtained from the B.E.S.A. Publications Department, No. 28, Victoria Street, London, S.W., price 1s. 2d., post free.

Corrosion of Steel.—Dealing with the cause and prevention of corrosion of steel, with particular reference to concrete reinforcing bars, Dr. Toch declared that the general statement that concrete prevents corrosion is not correct. He finds that, while steel embedded in concrete consisting of 1 part portland cement and 2 parts of sand seems to be completely protected from corrosion, the same steel will corrode in a mixture of other proportions. Three coats of the proper kind of paint on exposed steel, he said, will last five to ten years. On steelwork exposed to the sun, black or a dark-red oxide of iron, as the first or second coat, will stand exposure much longer than a light or white coat.

TOWN GAS.

SOME COMMONPLACE REMARKS ON MANUFACTURE AND SUPPLY IN SCOTLAND.

By W. B. McLusky, of Halifax

[A Paper before the Scottish Junior Gas Association (Eastern District), on Oct. 10.]

[In the early part of his paper, Mr. McLusky recalled the part taken by Scottish engineers in the development of, especially, the "selling" of gas. Carbonizing yields and ash in coke—with a word for "good" coke—were discussed, and finally the relationship between gas sales and the selling price.]

You were addressed last year by a gentleman from England—one who had filled an honoured place in the gas industry of Scotland for many years. Now you call upon a Scot from the wind-swept moors of Yorkshire to talk to you. I wonder what you expect!

When I lived among you I worked with you, and enjoyed it. Perhaps you will expect me to say something to you today about my work among the Yorkshire Juniors. Well, they are a fine lot, and I like the way they tackle their work. They turn out in large numbers to their meetings; and whatever they have to do, they "set about it" and "keep going." The discussions at these meetings give one the impression that every individual member is an expert in some branch of the business; and the speed at which experiences are exchanged is stimulating.

Of course, there are many important gas undertakings within easy reach of a central meeting place in Yorkshire; and the number of well-qualified men in positions of responsibility who persist in calling themselves "Juniors" is large. The Leeds University and the well-equipped Technical Colleges—of which, I should think, there can be none better anywhere—provide really attractive facilities for the increase of knowledge which the young Yorkshireman wants; he must want it, because the class rooms are packed, and the standard set and attained is high. It should not be forgotten that the standard of education generally in Yorkshire is high. I bring you greetings from the Yorkshire Juniors, and from their President, Mr. E. Gillett.

These are, however, but preliminary remarks. The subject I have chosen for our talk this afternoon deals with the things we all know and come in contact with in the discharge of the duties of the day. Here and there I may stumble over some half-forgotten truths. If I do, you will say: "After all, we have found something not altogether wanting in originality or interest."

For example, it is the merest platitude to say that in times past we made gas and *sent* it to the town; that four times a year we sent a man after it to look at the meter, but only for the purpose of seeing how much gas had passed that point since the last visit three whole months before. We firmly believed that profits were made in a place called the retort house. Times have changed since those far-off days. Thomas Hardy said 25 years ago that "There is nothing so permanent as constant change." When we attend to the wants of our consumers, we are not neglecting the retort house. Retort house practice in Scotland has always been maintained at a high level of efficiency; and, in places, much good work has been done in the realm of gas supply.

Controlling Interior Pipes.

With one or two notable exceptions—and to these full justice will be done—the work of controlling the dimensions of interior pipes, and the mode of fixing gas pipes and fittings in the premises of consumers, have been neglected by the authorities—namely, the administrators of gas undertakings. One would expect that municipalities, at least, would encourage every scheme calculated to save waste and improve service. It is done in the case of water supply—not, surely, because the waste of water does not increase the consumer's water bill. The reticence displayed by the municipalities is difficult to explain. It is a striking commentary upon the municipal administration of public utility undertakings that some authorities seem to deny to their customers the services and facilities which a public or private company in like circumstances so cheerfully gives. This attitude is inconsistent with the aims and objects of municipal administration. What can be the aim of the municipality that withholds such services?

It might be urged that gas supply under municipal control costs less. One can point to towns supplied at low prices by municipalities; but there are areas supplied by gas companies at equally favourable rates inclusive of maintenance, right up to the point of ignition, and it is remarkable that the amount paid by consumers by way of dividend on capital invested in gas company supply is less in many instances than the amount

collected by municipal undertakings for the payment of interest and sinking fund charges.

One of the earliest workers in the field of gas supply was a municipal gas engineer—namely, Mr. George R. Hislop, of Paisley. Thirty-nine years ago he took up the remit from a Special Committee of the North British Association of Gas Managers to find a standard gas burner for cannel gas. In 1887 Mr. Hislop presented a preliminary paper on the subject, and the following year at the annual meeting he produced the final results. His work was not confined to a burner that would indicate a higher candle power only under laboratory conditions. In co-operation with Mr. George Bray, of Leeds, he produced a burner that enhanced the value of the gas to the consumer; and his work eventuated in the fixing of the angle at which the jets forming the union jet burner impinged upon each other. George Hislop was a public benefactor. Mr. Hislop, of course, determined the pressure in order to control the velocity of the flow in relation to the angle, and afterwards he divided his district into pressure zones, for each of which zones Mr. Bray made a burner. Every burner was marked to suit (1) the candlepower of the gas, (2) the pressure in each particular zone, and (3) the quantity of gas to be consumed per hour.

Governors on the District.

The next step was the control of the pressure in the district. Mr. Peebles—the inventor of the consumer's needle governor and other types of governors which are well known to-day—Mr. William Foulis, of Glasgow, Mr. Robert Mitchell, of Edinburgh, and Mr. John Macrae, of Dundee, took an active part in this work. Colonel Carmichael Peebles, the son of Mr. D. Bruce Peebles, has now made pressure control really automatic. The latest Peebles governor, in which hand-loading is dispensed with, marks a great advance in governor practice, for the new governor can be used, not only as a station governor, but also for the control of pressures in any part of the district of supply.

The hilly districts of Scotland provide abundant scope for the distribution engineer; and the hills and dales of broad Yorkshire, especially the areas supplied severally by the Sheffield, Bradford, and Halifax Gas Authorities, provide opportunities which are denied to those whose areas are less undulating. The district governors in Halifax are properly housed in roomy underground buildings.

The modern aid to uniform district pressures is, of course, high-pressure transmission. In Halifax the high-pressure mains running in different directions over the hills not only transmit supplies to villages situated at the end of each line of pipe, but also shunt supplies to valleys right and left, at different points on the route, thus reinforcing the volume and, under governor control, maintaining a uniform pressure throughout the several districts. Much money has been saved by schemes of this kind within the past fifteen years in different parts of this hilly island; and in the flat country high-pressure transmission has solved the problem of gas supply in rural areas. Engineering is as useful in the work of distribution as it is in the construction of plant for the manufacture of gas; but machinery, plant, and mains, however efficient they may be, do not sell gas. That is a man's job.

The Sales Side.

It should hardly be necessary to stress the importance of the sales side of our business at a meeting of Scottish engineers. Selling is an instinct—a natural impulse. The Scot should do this kind of work intuitively.

> "What, no reflection on the reward! He might have had an intuition at it, as the encouragement, though not the cause of his pains."

In the year 1888, James McGilchrist presented a paper to the North British Association of Gas Managers entitled "Selling Gas," in which he made the following remarks:

> "I merely wish to point out how we have lost business through giving too little attention to the selling of gas. . . . Had we given this question a tithe of the attention that we have bestowed on its manufacture, I am convinced that our rivals would not have enjoyed one-half of their present popularity. . . ."

It is interesting to recall, in this connection, that Paisley and Dumbarton were among the first towns in Scotland to push the sales side of the business; and this they did by specifying the dimensions and the mode of fixing pipes in consumers' premises, and by fixing suitable burners for all classes of consumer. These pioneers did not complain of want of sanction. They realized their responsibilities to consumers, and did all things necessary to ensure satisfactory results from the gas consumed. They established what we call "goodwill," and only by goodwill can a permanent and growing business be secured. They did more, these early workers in the gas industry—they produced a good gas at low cost, and sold it at a comparatively low price. Competition in the matter of price, as between town and town, was keener, if possible, in those days than it is to-day. In the West of Scotland at that time Glasgow was first, or lowest, in price, Paisley second, and Dumbarton third; but on the Scottish Border, that douce man Alexander Scott, of Galashiels, had them all beaten for a time.

The increasing demand for cannel coal, however, and the higher prices charged for this material, brought about a gradual lowering of the then 30-candle standard of illuminating power prevalent in Scotland; and as the top candle cost about 1½d. per candle per 1000 c.ft. in those days, the struggle between the conscience and a desire to save the bawbees can be well imagined.

Carbonizing Practice Years Ago.

Down to this date—the late eighties—10,000 c.ft. of gas per ton of coal carbonized was reckoned a satisfactory result; and, indeed, this standard was only attained in works equipped with really good regenerative furnaces. The gradual fall in the standard of illuminating power did not tend to an increase in the yield of gas per ton of coal carbonized, for the first step—indeed, the purpose of the change—was to reduce the percentage of the richer and higher-priced cannel, and thereby lower the cost of production.

It is perhaps worthy of remark that, in the year 1888, 47·88 p.ct. of all the coal used in gas-works in Scotland was carbonized in regenerative retort settings, and work then in progress was calculated to bring this figure up to 60 p.ct. Sir Frederick Siemens' furnaces and modifications of the same—introducing many interesting and important changes in detail, on which we might have dwelt with profit, had time permitted—were at that early date already working in Glasgow, Edinburgh, Dundee, Aberdeen, Kilmarnock, and Kirkcaldy, and possibly in other towns—I speak from memory. The Klönne settings were installed at the Inchgreen Gas-Works, Greenock, about the year 1886 or 1887.

The aim of the carbonizer in those days was the "three tens":

> 10,000 c.ft. of gas per mouthpiece.
> 10,000 c.ft. of gas per ton of coal carbonized.
> 10 cwt. of coke for sale.

The retorts were small in the case of regenerative settings. The Dundee dimensions were as follows: 8 ft. 4 in. by 20 in. by 14 in., "stop-ends," and carbonized 18 cwt. of coal per diem—charges of three hours' duration. The Glasgow retorts, also "stop-ends," were smaller in section originally—namely, 18 in. by 13 in.—and carbonized only 14 cwt. of coal per diem. The dimensions were later increased to 21 in. by 15 in. This section of retort carbonized 22 cwt. of coal per diem. The Aberdeen section of retort was 25 in. by 14½ in.—a much better shape for the cracking of the rich gases from cannel coal. These retorts produced 10,000 c.ft. of gas per mouthpiece per diem, and carbonized 20 cwt. of coal in the same time.

All these things happened nearly forty years ago. Speaking about Aberdeen reminds me that the price of gas in the "Granite City" is to-day 5·88d. per therm, so that the good work is still going on.

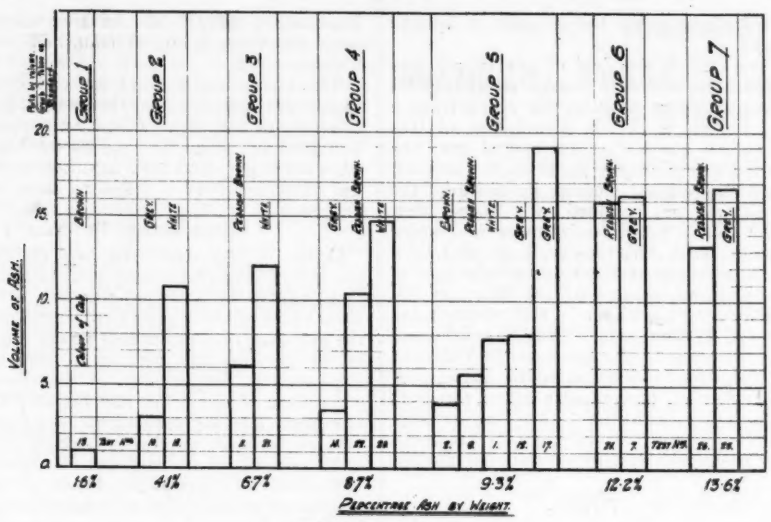
About this time—1886-7—Mr. G. R. Hislop designed and worked a retort setting which gained a world-wide reputation for its easy manipulation and general excellence. In the year 1896 I checked the results of these settings at the gas-works at Berwick-on-Tweed over a period of six weeks in mid-winter, and the yield of gas per mouthpiece per diem was over 12,000 c.ft. throughout the period. The retorts in use measured 22 in. by 15 in.; and the length was, I think, 9 ft. 3 in. The Engineer in charge at that time was Mr. A. B. Walker, who afterwards migrated to Walker and Wallsend. With perhaps better coal, and a setting that was certainly not so good, Mr. Alexander Scott, of Galashiels, had corresponding yields of gas from retorts 9 ft. by 25 in. by 15 in. The yield in therms is not recorded in either case, but obviously the results were good in this respect also.

The coal used in both instances responded quickly to treatment in the retort, and the residual coke was of good quality. It not only made a good fuel for furnaces, but it commanded a ready sale. A ready sale for coke is an important consideration in these days. Turnover and revenue should run in tandem. It is a commonplace to say that persistent effort to run a good secondary products business alongside the sale of the premier product, gas, tends—perhaps more than anything else—to put the gas into the mains at a price which makes the gas salesman's work easy.

To "dump" coke on a neighbour's market spells "turnover" without "revenue," and that is neither neighbourly nor wise. Rather than waste our resources in railway rates and freights, why do we not spend money in the payment of wages to men who will take the coke to any customer within the area of supply at one price delivered independent of distance, just as gas is supplied at one price to all consumers within the area of supply? This plan seems to work well in Halifax. The fuel is graded and put up in bags for small users and others who prefer that mode of delivery.

Ash in Coke.

The volume and colour, as well as the percentage by weight, of the ash in coke has, as you must know, an influence on the



YORKSHIRE COALS.

mind of the user of coke. Price will not alter that. Once you deliver the "real goods," the customer will have it whatever name you give it. I have brought with me a few samples of the ash from some of the better known seams of coal mined in the West Riding, the Barnsley District, and in the South Yorkshire Field. These will interest you. The numbers on the various tubes are merely our "ash register" reference numbers. The percentage by weight of each of the samples is shown on the chart, on which also the difference in bulk in relation to weight is projected.

A bulky ash is objectionable for any trade or domestic purpose. A high iron content condemns the fuel. In one of the samples before you, only one fifty-second part of the ash is iron, and the coal from which this ash is taken costs no more than others of corresponding value in other respects. This is a good all-round coal; but there are other coals rich in volatiles whose only detracting property is ash, and there are many such coals in Scotland. I speak from past experience when I tell you that it pays to use such coals and burn the residual coke in the producers. It paid when carbonizing was an intermittent process; it will pay better when the coal is carbonized in continuous vertical retorts.

You may ask: "What about the wages costs?" An increase of 25 p.ct. in carbonizing wages would in most cases not increase the gross cost of manufacture by one-halfpenny per 1000 c.ft. This amount, and more, will be saved if good gas-making coals are not excluded because of the high ash content of the coal, provided, of course, the work can be arranged as it has been arranged in certain gas-works, whereby only the best coke is offered for sale, and the proportion of coals producing a coke which is not of the highest quality is limited to the amount which will produce sufficient coke to fire the furnaces. A good coke, however, finds a ready sale, and makes a market strong enough to exclude the intrusion of other fuels. A good coke commands at least 1d. per cwt. more than one that is called "just as good."

It was easy to talk about coke in the year 1921 and later, when prices were high; the ordinary price for coal being 34s. to 35s. at the works, and coke commanding 45s. and over. But it is just as easy to find a home market to-day as it was then, and those who attended diligently to the wants of local users, in spite of tempting prices for shipment, are fortunate to-day.

Those who sold 10½ cwt. of coke per ton from efficient horizontal retorts four years ago did better than their neighbours who sold only 9 cwt. of dry coke from continuous vertical retorts. At the present time, 70 therms of gas in the holder and 10½ cwt. of coke over the sales weighbridge is only equal to 82 therms in the gasholder and 9 cwt. of coke over the sales weighbridge. This comparison is established on a fuel and labour basis as follows:

12 therms at 1½d. = 1s. 6d.
1½ cwt. of coke at 1s. = 1s. 6d.

A saving in wages will accompany the higher production of therms in the form of gas. A further saving in wages will attend this process, because the handling of coke costs money. Coke stocks cost money, too, not only in labour, but in decrepitation of the fuel, which reduces the value and adds to the "expenses on residuals" in other obvious ways.

Selling Gas and the Price at which We Sell.

We are gas merchants first and last; and if I have devoted some time to the sale of coke, I have done so because I know how much the secondary products business can contribute towards a low selling price for gas. A low selling price for gas is the final test of good management—good management over a long period—not only in the retort house, but in every branch of the business. I do not say that the price of gas in Scotland has not always been comparatively low. A glance at the prices charged to-day shows that there are five towns in Scotland with prices at or below 2s. 6d. per 1000 c.ft.—namely:

—	To-Day.		Pre-War.	
	Price.	C.V.	Price.	C.V.
Uddingston . . .	2/–	..	2/–	Probably higher in every case.
Helensburgh . . .	2/1	..	2/6	
Kirkintilloch . . .	2/2	450	2/6	
Aberdeen	2/6	510	2/3	
Dunfermline . . .	2/6	430	2/3	

with meter rents free, and cookers and fires too—in many cases.

There are, I know, many other undertakings showing equally good, and in some instances better, results, and which are, in fact, producing gas and distributing it at a very low price. The consumers in such towns, however, are denied the advantage of economical working and good management because the undertaking is over-loaded with interest and sinking fund charges; so that it would appear that alterations are not always improvements. Alterations that pile up debt for posterity to pay are certainly not improvements.

> "A disposition to preserve and an ability to improve, taken together, would be my standard."—Burke.

Without the disposition to preserve the best work of a predecessor, we cannot improve at all. You may say that without some alterations it would be very difficult in these days of high prices to compete with the work done forty years ago when stokers had to work twelve hours a day for 5s., and coal was delivered on the gas-works at 6s. a ton; but the works I have cited have been able to effect the transition from low wages to high wages, from long hours to shorter hours, from low prices for coal and other materials to very high prices for everything, and are selling gas to-day at prices lower than ever in some cases. Why? Because the capital account has been reduced, and the business has expanded and increased. To such an extent has this policy of wisdom been persisted in, that there are many gas undertakings in Scotland—and in Yorkshire too, you will not be surprised to hear—where the gas undertaking is free from debt, and has liquid reserves to meet any emergency.

We need not stop to complain of differences in calorific value. What we call local coals may not be over-rich, but they will produce gas at a lower cost per therm in many cases than coals brought from a distance. Freights increase the delivered price of any coal to a works situated at some distance from the coalfield. We must not be surprised, therefore, if works in that position aim at a high calorific value, because a good coal always costs less per therm in freight.

In any event, one therm may not add more than 1½d. to the price of 1000 c.ft. of gas, and we must concede that, if one works is supplying a lower calorific value than another, the advantage is all to the consumer, because very few gas undertakings sell any part of their output at anything approaching 1½d. per therm.

It is true that gas of 400 B.Th.U. is a degree lower than one that is sold at five therms to the 1000 c.ft., and produces

revenue accordingly. But gas at 500 B.Th.U. is more than a degree below the standard supplied in Scotland until a few years ago; and in making a comparison between the prices charged thirty years ago, in 1914, and at the present time, as set out in the following table, we should in fairness keep in mind the quality of gas supplied in the earlier period.

In this statement there are included only those undertakings which sold gas at 3s. 6½d. or less per 1000 c.ft. in the year 1895. Even in those early days meter rents had been abolished in most of the Scottish burghs, and in some cases the smaller cooking appliances were supplied, fixed, and maintained free.

Town.	Engineer and Manager.	Price of Gas to Ordinary Consumers.		
		1895.	1914.	1925.
Hamilton	Wm. Ewing	2/1	1/8	2/6
Glasgow	Wm. Foulis	2/6	1/11	3/2
Paisley	Geo. R. Hislop	2/8	2/2	3/5
Alloa	Alex. Yuill	2/10	2/1	2/11*
Dumbarton	Jas. McGilchrist	3/–	2/6	2/10
Kilmarnock	Wm. Fairweather	3/1½	2/3½	3/6
Kirkcaldy	A. McPherson	3/1½	3/4	5/2
Edinburgh	Rob. Mitchell	3/2	2/8	3/6
Greenock	Sam. Stewart	3/2½	2/6	2/6¾
Aberdeen	Alex. Smith	3/4	2/3	2/6
Airdrie	Thos. Turner	3/4	2/7	4/4
Broughty Ferry	Alex. Waddell	3/4†	2/2†	3/4†
Coatbridge	Thos. Wilson	3/4	2/1	2/9½
Dumfries	Geo. Malam	3/4	2/8	3/4
Dundee	John McCrae	3/4	2/2	3/4
Galashiels	Frank Scott	3/4	2/10	4/–
Hawick	Jos. Smith	3/6½	2/3½	4/6
Cambuslang	Jas. Donaldson	3/6½	2/9	4/5
Uddingston‡	Laur. Hislop	3/6½	2/–	2/–

* *Plus* 7d. for subvention to Electricity Department.
† Now supplied by Dundee.
‡ Now (1925) includes Larkhall, Bellshill, Holytown, &c.

The engineer who sets his face against unnecessary capital expenditure, and who attends to his customers and increases the sale of gas, will be a success. Where the sales are good and growing, where the capital charges are low and "lowering," the price of gas is bound to be low. The main points are, of course:

(*a*) An increase in the sale of gas per mile of main
(*b*) " " " " " per service pipe
(*c*) " " " " " per meter
(*d*) " " " " " per £1 invested in the business.

No other important consideration can be neglected without loss. An increase in the number of consumers is desirable; a satisfactory revenue per head of the population must be maintained. Attack is the most effective weapon of defence, especially when there are raiding parties about; but more business per existing consumer is the most profitable kind of business we can get.

The statistics compiled for the year ended at various dates in 1924 show an increase of 21 p.ct. in the amount of gas sold in Scotland over a period of ten years, during which there was an increase of only 6·68 p.ct. in the number of consumers. The corresponding figures for England and Wales are 22·18 p.ct. and 11·5 p.ct.

The effect is as follows:

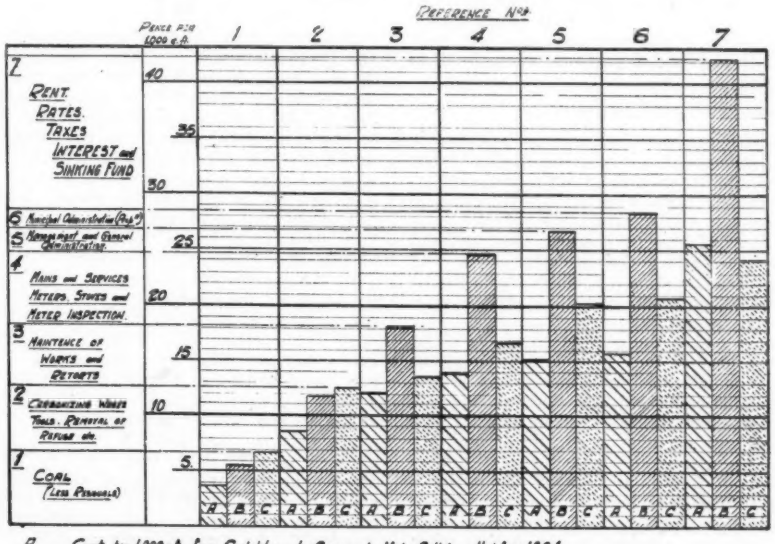
	England and Wales.	Scotland.
Gas sold per consumer—Increase in ten years	3103 c.ft.	2972 c.ft.

The average price received for gas in the 21 undertakings cited here is 3s. 2½d. per 1000 c.ft.; and the increase of 2972 c.ft. at 3s. 2½d. has increased the total revenue per consumer by 9s. 6½d. per annum. The capital employed in the works named averages £9 9s. 5d. per consumer, so that this additional revenue of 9s. 6½d. per consumer makes a handsome contribution towards the payment of interest on capital.

This increase has been a good thing for the revenue—the earnings—but there have been savings, too. The system of carbonizing has been changed—in some cases from "stop-end" horizontal retorts and hand labour throughout to continuous vertical retorts, with all their labour-saving advantages and higher yields of gas per ton of coal carbonized. It would not be an exaggeration to say that the whole of the extra gas used per consumer at the present date, compared with ten or eleven years ago, is being provided without any increase in the number of tons of coal used in gas-works which have changed-over from the earlier to the newer method of working.

It is better to sell 5000 c.ft. of gas at 2s. than 4000 c.ft. at 2s. 6d. The revenue is the same in both cases, but the lower price is more attractive, and whatever we do we must maintain the revenue. In individual cases I notice that the revenue has been maintained in spite of generous reductions in price, and that in quite a number of towns an increase of 10 p.ct. in the sale of gas has been maintained over a period of ten years, while in others the increases vary from 5 to 8 p.ct. per annum over a like period. Over a period of 37 years the increase in the consumption of gas for the whole of Scotland has been equal to 6·43 p.ct. per annum.

A gentleman in a responsible position in the gas industry recently said that a cumulative increase of 5 p.ct. per annum is good business. I would accept that rate of progress, together with a 5 p.ct. decrease per annum in the capital employed; and if you young men will put your heads together and pursue that policy, we shall have some cheap gas in twenty years.



A. Cost per 1000 c.ft. from Coal Wagon to Consumer's Meter Outlet Halifax 1884
B. " " " to Consumer's Burner Halifax 1924
C. A neighbouring Gas Works 1924

COST OF PRODUCTION, DISTRIBUTION, &c.

Education Scheme of Institution of Gas Engineers

From the Institution of Gas Engineers we have received two pamphlets which deal with the Education Scheme. One of these outlines the craftsman's division and the intermediate section, which comprises the minor grouped courses of the City and Guilds of London Institute in gas engineering and gas supply. Further information regarding these courses, together with a list of the schools at which instruction is provided or examinations are held, may be obtained from Mr. C. C. Hawkins, M.A., Superintendent, Department of Technology, City of Guilds of London Institute, No. 29, Roland Gardens, Old Brompton Road, London, S.W. 7. The other pamphlet concerns itself with the professional courses of the scheme, and contains a list of technical institutes at which application may be made for instruction in the science subjects ancillary to gas engineering and gas supply. This pamphlet, and any further information, may be obtained from Mr. Walter Hole, Organizing Secretary, "Wharfedale," Barton, Torquay. The matter contained in these pamphlets was published in the "JOURNAL" for April 22, p. 235.

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT.)

[The President of the Association, in his address, voiced his opinion that the gas industry should give greater consideration to the potentialities of low-temperature carbonization. He looks forward to the time when light, heat, and power in the form of gas and electricity will be supplied by a gas-electric combine.]

The Western Juniors opened their twenty-second session on Saturday last, in the Royal Technical College, Glasgow, when Mr. Robert Gray, Assistant Manager at Hamilton, delivered his Presidential Address. Mr. John M'Isaac (Past-President) occupied the chair; and there was a large attendance.

The Hon. Secretary (Mr. J. Murray) intimated that the Council had that evening elected Mr. Thomas Carswell (Glasgow) to fill the vacancy on the Council caused by the resignation of Mr. James Brown, who was recently appointed Assistant Industrial Superintendent to the Sheffield Gas Company.

Mr. M'Isaac cordially thanked the members for their support during his term of office, and appealed for the same support for his successor.

Mr. Gray, who was received with applause, thanked the members for the honour they had conferred upon him, and proceeded to deliver his address.

PRESIDENTIAL ADDRESS.

Within recent months we have read and heard a great deal regarding the development of the electrical industry. Greater prominence has been given to this industry lately than has ever been experienced in its history. Since this prominence developed, there are many people who appear to despair of the future prospects of the gas industry; but usually such persons have no knowledge of its prospects. What really is the future of the gas industry? Is there the slightest cause for anxious thought of its prospects? Have we good reason to believe that the gas industry can look forward to a bright and progressive future?

Natural Resources of Great Britain.

Let us, in the first instance, examine the natural power resources of this country, and compare them with similar resources of other countries. The position which Britain occupies in the industrial world has its foundation in its extensive coalfields. These have been, and still are, the source from which we have derived, and must derive, our power for industry. Any other resources at our disposal represent only a mere fraction of our power requirements. To compare the growth and development of electricity in water-power countries such as Norway, Sweden, Switzerland, and Canada with our own is not reasonable. They are essentially water-power countries; ours is essentially a coal-power country. As such, it is necessary that we do not abuse our resources, but use them in a scientific manner.

Utilization of Coal Resources.

Large quanties of raw coal are used in the household and in industry; but at what expenditure of our national wealth! The domestic consumption is almost 40 million tons per annum; industrial purposes account for 90 million tons. This coal is consumed yearly with only a small percentage of the total energy given up in the form of heat or power. Our national wealth is being burned-up ruthlessly and wastefully. How long can this continue? The time must come when this country will be compelled by circumstances to take a more serious view of the utilization of her coal resources.

The quantity of coal consumed in the generation of electricity in this country is about 7,500,000 tons per annum, or about 4·5 p.ct. of the total. It is an admitted fact, however, that less than 20 p.ct. of this amount is converted into electrical energy. Of every ton of coal entering an electric power station, less than 4 cwt. is converted into useful energy, the remaining 16 cwt. being wasted. This means that every year the electrical industry destroys about 6 million tons of the nation's coal power; only about 1,500,000 tons being actually converted into energy in the form of light, heat, and power. The electrical industry can offer only one product to the nation after treating the coal. Is the remaining 80 p.ct. of the coal so valueless that it can be thrown to the winds? Is it not true that about 2 million tons of coke, 60 thousand tons of sulphate of ammonia, and 60 million gallons of tar could be recovered from this quantity of coal, not mentioning the tremendous volume of gas which could be recovered and converted to useful purposes? We live in an age of science—an age which demands that everything must yield its true value. Waste is a sin; yet we appear content to waste our coal power, regardless of the effect on our national well-being.

Is the electrical industry in such a state of financial depression that it cannot pay for its own development? Must the taxpayer be further burdened in order to relieve those who are users of electricity? I would say, "Leave the electrical industry to develop itself."

As shown by the Board of Trade Returns, the gas industry carbonized over 17,300,000 tons of coal last year, or a little more than 10 p.ct. of the total coal consumption of Britain. It is of interest to note that, in 1924, 237,000 tons less were carbonized than in 1920, and yet the quantity of gas produced was over 17,000 million c.ft. more than in 1920—an increased production of gas from a decreased quantity of coal. Surely this represents progress! Speaking of gas, however, we speak of only one product. Last year the gas industry recovered from the quantity of coal carbonized, and placed at the nation's disposal, 11,600,000 tons of coke, 124,700 tons of ammonium sulphate, and 195 million gallons of tar. The gas industry not only provides light, heat, and power for domestic and industrial purposes, but coke for industry, ammonium sulphate for agricultural purposes, and tar for road making and the manufacture of numerous chemical products, including dyes. Of the total quantity of coal carbonized yearly, the gas industry is returning almost 80 p.ct. in the form of various products. It must be remembered, however, that the products recovered are of infinitely greater value than is the original coal. I believe that, of the total coal consumption of Britain, the gas industry can claim to treat their portion more scientifically and, at the same time, more efficiently than does any other consumer of coal. Since its inception, the gas industry has continually striven towards scientific perfection, in order that its service to the nation might be of ever-increasing value.

Low-Temperature Carbonization.

A scientific process which has even arrested the attention of the man in the street is that of low-temperature carbonization and the production of smokeless fuel. Much money and labour have been expended in attempting to solve this scientific problem, but it is only within very recent times that it has received worthy prominence. I believe the future of low-temperature carbonization is bright. It may not be a commercial proposition at the moment, but the future will bring this to success. It is a process which has great possibilities. It offers not only a solid smokeless fuel, but also large quantities of fuel oil. One of the greatest problems yet to be solved in this country is the consumption of raw coal by our industries and by the household. Is it not possible for the whole or part of the 90 million tons of bituminous coal consumed each year for power purposes by our industries, and the 40 million tons used by domestic consumers, to be profitably subjected to some preliminary form of scientific treatment, whereby the valuable products may be recovered, and not destroyed as at present? It is in this direction that I believe the gas industry capable of rendering the nation a great service. It cannot stand aloof from the low-temperature carbonizing process, but must assist in the preliminary work necessary for ultimate success. I do not think the addition of low-temperature carbonization would in any way tend to decrease or eliminate the high-temperature process.

Supply of Electricity by the Gas Industry.

A point worthy of note and of great consideration is that of the generation and supply of electricity by gas undertakings. It will have been observed from the Technical Press, that within recent months many gas undertakings have applied for and obtained powers to generate and supply electricity. This is not altogether unusual, as the number of gas undertakings which are also supplying electricity has increased fairly rapidly within recent times. Have we to take it that this is to be a new branch of the gas industry? Will the two competitive industries yet become one great combine for the supply of light, heat, and power in the form of gas and electrical current? I believe that it is not impossible.

As I have already pointed out in this address, the generation of electricity by the consumption of raw coal, without the recovery of residual products, is wasteful, and does not coincide with the practices of a scientific age. It may be argued, however, that the electrical industry, if it is thought necessary, can instal plant for the scientific treatment of coal, coinciding with the generation of electricity. This is possible; but why duplicate the coal carbonizing plants of the country? Would it not involve unnecessary capital expenditure? Must the nation's wealth, in coal and money, be sacrificed and squandered, simply for preserving one industry's dignity against another? It is possible for the gas industry to generate electricity by one system or by a combination of methods, whichever might be decided upon as being most adaptable to the existing conditions. In many gas undertakings there is a quantity of surplus heat available which could be utilized for steam-raising purposes, and the steam in turn could be used as power for generating electricity. Again, it is possible, with the carbonizing plant available, to carbonize coal slack for the production of low-grade coke and breeze for steam-raising purposes; the steam being employed as before for generating current. It may be said that the surplus heat available would be unable to generate sufficient steam for the desired purpose. This might be so in certain instances, but it would always be possible to have gas-driven generators as auxiliary plant, so that these could be brought into operation when the load was greater than the output of the steam generating sets.

With the introduction of smokeless fuel plants, it is probable that greater possibilities for the generation of electricity by gas undertakings may become obvious. Where the smokeless fuel

plant gives a gas of low calorific value, the gas could be utilized for steam-raising purposes. In the case of plants giving a high-grade gas, this could be used for driving large gas engines for the purpose of generating electric current. The coming of the gas turbine is still delayed, but I believe the present difficulties will eventually be overcome, and that this appliance will displace less efficient machinery at present in use. With the coming of the gas turbine, there will open out to the gas industry an entirely new field whereby the industries of the country will benefit to a large extent.

It may be asked what advantages are to be gained when gas and electricity are supplied by the same undertaking. I believe the advantages to be many, though there are at the same time disadvantages in such cases. Probably the greatest advantage is that the work of the joint undertakings would be more economical and more efficient than two separate concerns. As I have already pointed out, it would be possible for a gas undertaking to generate electricity by a variety of methods, whereas in the electrical industry they are bound down almost entirely to one method, and, moreover, one which is admittedly wasteful and inefficient. It has been suggested by a Committee over which Mr. Lloyd George presided, that it would raise the efficiency of electricity production if the coal was first subjected to carbonization, previous to being used for steam production. Is not this the everyday practice of the gas industry? Why should it be necessary to set up new carbonizing plants for the production of electrical current, when units are already in existence throughout the country? Many electrical undertakings are realizing the value of one of the principal products of the gas industry, and utilizing it for the production of steam. Large quantities of coke are being consumed annually by the electrical industry. I believe this marks a future stage in the gas industry. A combined industry would give the consumers a service which at present is not obtainable. Gas and electricity would be applied to the uses of the consumers to which they are best suited. Those in authority in both industries know the limits to which their products may be best applied in the form of light, heat, and power; but as long as the industries are separate, those limits will be overreached, to the consumers' loss.

Many people think the gas industry has entered upon a process of gradual decay, and that time alone separates it from final disappearance. Let us look at the records of the gas industry for the past few years. What do they reveal, progress or decay? The quantity of gas sold last year showed an increase of more than 15,000 million c.ft. over 1923, and almost 21,500 million cubic feet more than the quantity sold during 1920. Many believe that gas for street lighting is slowly being eliminated. What are the real facts? Compared with 1923, the quantity of gas consumed for street lighting last year increased by 637 millions, and was greater than the quantity in 1920 by almost 2700 million c.ft. During last year 183,000 more people realized, and secured, the services of gas. Since 1920 the number of gas consumers has increased by more than half-a-million. There are almost 8 million consumers of gas in this country, which means that gas is at the service of nearly 40 million people. Everything points to a state of progression. The gas industry has not entered upon the downward path, but goes on towards continued and increasing prosperity.

Mr. M'Isaac, thanking Mr. Gray for his address, said that, from past experience of the new President, they looked forward to receiving a courageous address, and had not been disappointed. Mr. Gray had given them food for thought; and to his mind the address suggested one thing—more publicity. Let the people know what the industry could do. There would then be nothing to fear.

Mr. James Hall, Vice-President (Glasgow), congratulated the President, and pointed out that, while they were fortunate in having Mr. Gray in the Presidential Chair, he alone could not carry on the work of the Association, but required the help and support of every member. With regard to the address, Mr. Gray had been very generous to their main competitors. He (the speaker) thought that the thermal efficiency of electricity was rather over-stated at 20 p.ct., and was of opinion that 12 to 15 p.ct. was nearer the mark. Commenting on the large coke stocks in most works, he said the reason was internal as well as external. He saw no reason why, by a careful selection and grading of coal, coke could not be of more general use both for domestic and industrial purposes.

Mr. Dickson (Kirkintilloch) said he had more than ordinary pleasure in being present to congratulate the new President. Kirkintilloch had been honoured in filling the Presidential Chair for the second time. He was sorry, however, he could not share Mr. Gray's optimism with regard to low-temperature carbonization. It was not at present a sound business proposition; residual market values varied too much. The present method of carbonization was, he thought, easily first.

Mr. Slade (Glasgow) expressed the opinion that, whether electricity was subsidized or not, it was the duty of everyone connected with the gas industry to see that gas was the service the consumer wanted. With extensive advertisement and satisfied consumers, they had nothing to fear.

Mr. J. Frazer, as an old junior, expressed his delight at seeing such a large attendance. Mr. Gray had touched on every side of the industry; and his message was an inspiration to all.

After a number of other members had taken part in the discussion,

Mr. Gray thanked them for the reception they had accorded his address. He still thought there was a great future for low-temperature carbonization. The gas industry must assist in the preliminary work. They could not stand aloof, and see this new industry set up.

Gas for Industrial Heating.

That in any competition with electricity for heating gas has little, if anything, to fear, is the opinion expressed by the "United states Investor," which goes on to say that, where proper attention has been given to the factors of design and efficiency, gas heating appliances have replaced electrical appliances. Except for minor applications and specialized processes where imbedded heat is necessary, gas will undoubtedly win out. This will be the first major victory of gas over electricity; and it will be the making of the gas industry. With the growing scarcity and increasing price of coal and oil, gas becomes more readily saleable. Not only that, but it represents a great saving in labour, because there is no handling charge, and it is more easily controlled. There is less wastage with gas; and this makes it much more desirable. Recent installation figures show that furnaces have produced a 7 p.ct. fuel saving. The gas industry is now on the threshold of its greatest era of prosperity. As the possibilities of gas for industrial processes are understood more and more, manufacturers will enter the field with improved appliances. The whole subject of industrial gas service opens up possibilities that one can only guess at. Ten years from now it will be the biggest gas load. There is no way of stopping it. Even if the gas utilities were to lie down on the job—and they are not going to do that—the manufacturers of gas appliances are going to push forward. Wherever oil is now being used, gas can be employed more economically with modern burners. Gas will replace oil in another twenty years.

Reclaiming Coke from Generator Ash.

The water-gas generator coke reclaiming system now in operation at the Spring Gardens Station of the Consolidated Gas, Electric Light, and Power Company of Baltimore is described by Mr. J. A. Beck, in the "Gas Age-Record." Hand picking and forking from the ash and clinker has been superseded by a complete system for mechanically separating by means of screens the coke and coke-sized clinker from the large clinker and fine ash. The coke-sized clinker is then hand picked from the coke as it passes over a picking belt. The water-gas plants are elevated so that the coke and ash leaving the clinker doors enter shoots directly under the doors, and fall into cars. After quenching, the material is hauled to a receiving hopper, where it is dumped on to a mesh grating which is readily adjustable. This adjustment was required as the size of the clinkers varies, depending upon the fusibility of the ash and other operating conditions. The clinkers remaining on the grating are thrown into trucks, to facilitate haulage to the ash dump. From under the receiving hopper an automatically fed skip hoist bucket takes the mixture of coke and ashes, and discharges it into an overhead cylindrical bunker with sufficient storage to accommodate the ashes produced during the night. A reciprocating feeder with an adjustable stroke feeds the material on to a double-decked vibrating screen, which makes three separations. The medium-sized clinker which has passed through the grating over the receiving hopper passes over the top screen section, and is discharged into the ash bunker. The balance of the material goes through this screen on to a second screen. The coke and coke-sized clinker pass over this second screen, and are discharged on to the picking belt; the fine ash falling through the second screen into the ash bunker. The coke passes off at the end of the picking belt into the coke bunker. From this it is elevated to the supply bunkers over the water-gas sets, and mixed with the incoming fuel. Should the pickers become careless, and allow clinkers to pass along the belt into the coke bunker, the fact is soon noticed by the operators in the generator house, and the trouble is quickly corrected. The plant (erected by the R. H. Beaumont Company, of Philadelphia) is efficiently performing a very useful service.

North of England Gas Managers' Association.—At the autumn meeting of the Association, to be held at 2.30 next Friday afternoon (Oct. 16), in the Council Chamber of the Town Hall, Stockton-on-Tees, Mr. W. W. Atley will deliver his Presidential Address. There will also be a paper by Mr. A. H. Middleton, of Consett, on "Refractory Materials in Carbonizing Practice." Members are requested to assemble at the gas-works, Thompson Street, at 2 p.m., for the purpose of an official photograph being taken; and the works will be open for inspection either before or immediately after the meeting.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following notices have appeared in the "London Gazette" regarding applications to the Board of Trade under the Act.

SPECIAL ORDER.

Rowley Regis and Blackheath Gas Company.

To authorize the Company to use scheduled land for gas purposes, to acquire additional land, and to raise further capital, to amend obligations as to the supply of gas, &c.

DECLARATION OF CALORIFIC VALUE.

Borough of Devizes.—425 B.Th.U. (Dec. 31.)

CLEETHORPES GAS AND TRADES EXHIBITION.

The recent nine days' exhibition organized by the Cleethorpes Gas Company in collaboration with the local Chamber of Trade has been an outstanding success. The Gas Company's private exhibition hall and parts of the commodious offices and showrooms were used for the stands, and the large and handsome board-room was utilized for cookery lectures and demonstrations. A uniform and very uncommon scheme of stand architecture and decoration was adopted, which gave scope for striking lighting effects of which the Company's Engineer (Mr. F. G. Brockway) naturally took advantage.

Although during the evening session 3d. was charged for admission, the exhibition proved so popular that the attendance at times taxed the capacity of the building, and in all nearly 15,000 people passed through. It was the aim of the promoters to make it unique as exhibitions go; and reports from disinterested parties with long experience of exhibitions go to prove that this aim was fully achieved.

Apart from the latest designs in the ordinary types of gas apparatus, the Company demonstrated a gas vacuum cleaner, a gas-fired factory boiler (steam), by Spencer-Bonecourt, the "Hendon" geyser, and the "Fox" water heater. Gas switches and distance lighters were also in evidence; and an exhibit which created a great deal of interest was a section of a house wall built in bricks and mortar on the showroom floor, demonstrating the actual application of "Nautilus" concrete flue blocks with a "Rubstone" mantel and inset gas fire complete.

A feature of the business done was the large proportion of high-grade cookers sold. It should be added that the Company do not let out stoves on simple hire. A very popular feature of the exhibition was the café served by an all-gas kitchen open to inspection by the public. On the last night after the doors were closed the whole of the exhibitors and staff with friends took supper together in the café; and among those present were Councillor W. J. Womersley, M.P., and Mrs. Womersley. The former, who is President of the Cleethorpes Chamber of Trade, addressed those present—congratulating them on the great success achieved.

ANNE HATHAWAY'S KITCHEN.

"O, he's as tedious
As a tired horse, a railing wife;
Worse than a smoky house——,"
Henry IV.

We are reminded of the poet's antipathy to smoke by an innovation which has been made in the kitchen equipment of Anne Hathaway's Cottage at Stratford-on-Avon, which tradition assigns as the house of the poet after his hasty marriage at the age of 18.

A "Black Prince" gas cooker, made by Messrs. John Wright & Co., of Aston, Birmingham (Radiation Ltd.), has been fitted in a tiny alcove off the kitchen. In Shakespeare's day cooking must have been a very smoky and laborious affair, and Mrs. Shakespeare must have unwittingly annoyed her youthful husband in those pre-gas days. With what delight would Shakespeare have welcomed the smokeless gas cooker to his kitchen!

Pinner Gas Company.—Messrs. A. & W. Richards have been authorized by the Company to offer for sale by tender £25,000 capital comprising 5000 £5 6 p.ct. irredeemable preference shares; the minimum price of issue being par. Tenders must arrive at the offices of Messrs. Richards, No. 37, Walbrook, E.C. 4, not later than 11 o'clock on Thursday, Oct. 22.

Broken Gas-Pipe Fatality at Manchester.—An inquest was held on Monday by Mr. C. W. W. Surridge, the Manchester City Coroner, on John Shaw, aged 58, of the Prince Albert Inn, Bradford Road, Manchester, who died through suffocation due to an escape of gas from a concealed pipe. A foreman pipelayer employed by the Corporation said that when he reached the inn the cellar grid was ablaze. He got the flags up, and on examining the gas pipe found a fracture of the socket about 4 in. long, from which gas was escaping. The fracture was 2 ft. below the surface. A superintendent of the Mains Department of the Corporation said the main pipe was laid about 27 years ago. When roads were up for any purpose, the Department took the opportunity of examining the pipes. Evidence was given that the road was up 100 yards from this point in 1924, and the pipes were then in good condition. The Coroner said the cause of the fracture could not be ascertained. It was impossible for the Corporation to dig streets up periodically to see if the pipes were in good condition. A verdict of "Accidental death" was returned.

BURES GAS COMPANY'S TROUBLES.

At a creditors' meeting under a receiving order made against Frederick Selling Smith, of Reigate, a statement of the debtor's affairs showed ranking liabilities £2559 and assets estimated to produce £83. His failure was attributed to losses arising from carrying on a gas-works and a coal merchant's business, inability to give these undertakings proper supervision, sale of the gas-works to a Company for a consideration which has not been satisfied, depreciation in value of debentures and shares, guarantees given on behalf of the Company without consideration, and heavy interest to moneylenders. It appeared that since 1920 the debtor has been employed by a gas company at £330 per annum, with free accommodation. In January, 1920, he purchased the freehold property known as the Bures Gas-Works, Bures Hamlet, Essex, together with the plant, machinery, &c., for £1050, of which £600 remained on mortgage. He improved the works, and carried them on, in addition to his salaried employment, until August, 1923, at which time he sold the works, with the goodwill, to a Company which he had formed for £5225, to be satisfied as to £1450 in debentures, £1925 in fully-paid shares, and £1850 in cash. The stocks on hand were taken over at a valuation (£400), of which he has received £296 only. The total sum he received in cash was £1496. He acted as Managing-Director of the Company, but the business was not successful, and a Receiver for debenture holders is now in possession.

Gasholder No Menace.

A curious case has been dismissed in the United States by Supreme-Court-Justice Tompkins; but it is reported that an appeal has been put in train. The town of Greenburgh (N.Y.) brought the action to compel the Westchester Lighting Company to remove a gasholder erected a year ago; and the decision of Justice Tompkins was that the town authorities had failed to establish that the structure and its operation were dangerous. Certain residents contended that the holder was "a menace, because it was liable to explode, and that noxious fumes endangered the health of the community." In his decision, Justice Tompkins held that the Company had in no way violated any ordinance of the town, and that there was no satisfactory proof that the erection or operation of the holder had produced any of the conditions prohibited by these ordinances, or that they were likely to do so. It would appear from the judgment that the action was the culmination of efforts made, during the work, to prevent the completion and utilization of the defendants' holder and the other buildings connected therewith. The contract for the structure was let in May, 1923; the work of construction began in August; and the first notice of protest from the town authorities was received on Nov. 13 of the same year, by which time the foundations had been laid, and many thousands of dollars had been expended on the work.

Licence Fees for Gas Main Inspection.

A short time ago the Borough of Warren (Pa.) appealed from a decree of the Court of Common Pleas of Warren County fixing the annual licence fee to be paid by the Pennsylvania Gas Company for inspection and regulation of the Company's pipes and mains; but the appeal to the Pennsylvania Superior Court has been dismissed. In view of the real lack of inspection of the Gas Company's pipes and mains by the officials of the borough, as disclosed by the evidence, the Court were not satisfied that the licence fee of $1.50 per mile of pipe within the borough limits fixed by the Court of Common Pleas was inadequate, and therefore unreasonable. Such licence fees, it was held, must be established on the basis of proper compensation for the necessary cost of the services performed, and not as revenue producers. On the other hand, the duty of inspecting and keeping in repair the streets and highways is imposed upon the borough. This duty the borough may not delegate to a private corporation. No matter how carefully such a corporation may, for their own purposes, inspect their pipes and mains, the imperative duty of the borough still remains. The Court pointed out that they were not to be understood as holding that the amount fixed by the borough ordinance ($7.50 per mile) would have been excessive or unreasonable if the borough had adopted and put into effect a system of inspection in any wise approximating in cost the fees imposed. Constant surveillance was necessary to see that openings made in the street for the laying and repair of mains and pipes were filled to the level of the remainder of the street, and kept so; but if such surveillance was not provided for and actually given, the borough could not ask to be compensated for what it had not done.

Belfast Gas Tragedy.—The Belfast City Coroner returned a verdict of "Accidental death" at an inquest on the body of Martha Robb, of Parker Street. The evidence of a daughter of deceased was that when she came home for dinner she found her mother lying dead in the kitchen. The tube of a gas-ring was hanging down, disconnected from the ring, and the tap was turned on. Her mother had suffered from nerve trouble for some time. The police said that apparently deceased had been seized by weakness, and in falling disconnected the tube from the ring.

Increased Gas Charges at Stockton.—The Stockton Corporation decided last week upon increased gas charges, both inside and outside the borough, of 3½d. per 1000 c.ft. The Gas Committee Chairman (Alderman M'Naughton) referred to the difficulties of irregular markets, and to the present anxious period. The increase would cover a deficiency of £5000 anticipated at the end of the present financial year on the present basis of trading. There was, however, a distinctly better feeling in the coke market. Mr. Allison, moving the deletion of the proposed increases, contended that there was an alternative, and that was to ask the borough fund to meet the deficiency. If it was good for the rates to have relief when there was a surplus, it was good to apply to this source when there was a deficiency. The amendment was defeated by 20 votes to 11.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Oct. 7.]

Nos. 24,070-24,703.

ALLEN-LIVERSIDGE, LTD.—"Gas-pressure regulators." No. 24,385.
DEUTSCHE-ERDÖL AKT.-GES.—"Fuel for gas engines." No 24,138.
PATTISON, M. R.—"Means of utilizing energy of gaseous products of combustion, &c." No. 24,118.
PINDER, G. M.—"Device for locating leaks in pipes." No. 24,318.
ROBERTS, E. S.—See Pinder, G. M. No. 24,318.
SATCHWELL, P. R. H.—See Pinder, G. M. No. 24,318.
SIEMENS-SCHUCKERTWERKE GES.—"Electric gas-purifier plants." No. 24,390.
STEPHENSON, A.—See Allen-Liversidge, Ltd. No. 24,385.
SUTCLIFFE, E. R.—"Distillation of carbonaceous substances." No. 24,183.
SUTCLIFFE, E. R.—"Apparatus for distillation of coal, &c." No. 24,415.
SUTCLIFFE, E. R.—"Treatment of coal, &c." No. 24,416.
WARD, T. E.—"Gas fires, &c." No. 24,256.
WOODHEAD, H. E.—See Allen-Liversidge, Ltd. No. 24,385.

Embezzlement at Aberystwyth.

At Aberystwyth Sessions, on Wednesday last, Edwin Wilfred James appeared in answer to five charges of having embezzled sums of money amounting in all to £40 17s. 5d., the property of the Aberystwyth Gas Company. Mr. Trevor Hughes, who prosecuted for the Company, said accused came from Wrexham about two years ago, and was appointed collector at a wage of £3 a week. His duty was to collect the gas accounts and give receipts from a book supplied with carbon paper to make a duplicate. A receipt was given to Mr. J. Morgan for £1 15s. 8d.; but on the duplicate the amount was 2s. 6d. received from "A. Jones." In the second case a receipt for £2 17s. 5d. was given, but the duplicate showed 3s. only. Other items were similar; and the prosecution alleged that sums amounting in all to £40 17s. 5d. had been embezzled. Accused pleaded guilty; and a strong appeal on his behalf was made by Mr. W. P. Owen, who said drink had been the man's chief enemy. The Chairman of the Bench (Alderman Rhys Jones, the Mayor) said the case was too serious to deal with under the First Offenders' Act, and accused would be committed to prison for three months with hard labour.

Reduction in Price at Ulverston.—The Ulverston Urban District Council have reduced the price of gas 3d. per 1000 c.ft., making the charge 3s. 6d. (3s. 7d. through prepayment meters), allowing for discounts. It is estimated that the amount of the concession will be more than covered by the favourable coal contract and economies effected in connection with the new method of charging the retorts.

Nottingham and Low-Temperature Carbonization.—As is well known, low-temperature carbonization at works to be established in connection with one or other of the local collieries owned by the Gedling Company was suggested as a means of supplying Nottingham with gas, and also of attaining for the city the distinction of becoming a smokeless town. The whole project, however, has now been discarded.

Pontefract Gas Exhibition.—The Pontefract Corporation Gas Department are holding an exhibition of gas lighting and heating appliances this week, a feature of which is a guessing competition arranged by the Pontefract Tradesmen's Association. For this purpose a ballot box used at the first local election under the Ballot Act of 1872 (loaned by Alderman O. Holmes) is in use as the receptacle for voting papers.

Walsall's Forthcoming Centenary.—Speaking at a public meeting at Walsall, Councillor J. A. Leckie referred to the work of the Gas Committee and the undertaking's contributions to the rates, mentioning that they had promised to contribute a further £9000, equal to a 6½d. rate. In January next, he said, would be celebrated the centenary of the making of gas in Walsall, and arrangements were to be made to mark the occasion.

Lancaster Gas-Works.—At the Lancaster Town Hall, on Oct. 1, Mr. A. W. Brightmore, D.Sc., M.Inst.C.E., held an inquiry into the application of the Corporation to borrow £54,100 for the reconstruction of the gas-works. Mr. R. M. Middleton (Town Clerk) said they had decided to adopt the chamber-oven system, and had entered into a contract with the Woodall-Duckham Companies. Mr. G. Dixon, the Gas Engineer, gave details of the scheme. There was no opposition; and the Inspector afterwards visited the works on St. George's Quay.

Ellesmere Port Urban Council.—At a meeting of the Council recently a statement of the accounts of the gas undertaking for the year ended March 31 was submitted. This showed a loss of £1762. A report was presented by the Gas Committee to the effect that tenders had been obtained for the supply and erection of a gasholder; and they recommended that tenders for the carrying-out of the necessary work in connection with the foundations be invited. The Gas Manager reported that he had obtained tenders for the proposed extensions to the retort house, and for the supply and erection of a coal elevator. The Committee recommended that application be made to the Ministry of Health for sanction to the borrowing by the Council of £23,000 for a period of 30 years.

Irish Gas Prices.—The price of gas in Ballymena has been reduced from 7s. 6d. to 6s. 6d. per 1000 c.ft. for lighting and to 6s. 3d. for heating purposes. The Dungannon Gas Company have lowered their price from 8s. 4d. to 7s. 11d. per 1000 c.ft.

Advertising Coke at Gorleston.—On the coal store at the works of the Gorleston and Southtown Gas Company there has been fixed a poster about 10 ft. long which suggests that people should get the "coke habit." It explains that a mixture of coal and coke (two-thirds coke and one-third coal) is cheaper in use than coal alone. At night this poster is lighted by a 1500-c.p. high-pressure lamp.

Gas Profits and the Rates.—Addressing a ward meeting at Blackpool, Councillor Newman condemned the making of large profits through the gas undertaking and devoting them to the relief of the rates. It was, he said, an injustice. He had been hammering at this in the Committee, and the members had come to his way of thinking—that they should let the consumers have gas at the lowest possible price. The majority of houses were assessed at £30, and a relief of 1d. in the pound only made 2s. 6d. difference; but big multiple shops, &c., benefited considerably, and yet might not burn one pennyworth of gas.

Chapel Whaley and District Gas Company.—Unfortunately an error crept into the report, on p. 47 of last week's issue of the "JOURNAL," of the Board of Trade inquiry into the Company's application for an Order which, among other things, would permit them to erect a new works at Whaley Bridge. It was stated that Mr. F. G. Shaw, Engineer and Manager of the Buxton Gas Department, said that he did not consider it essential that a gas-works should have a railway siding. As a matter of fact, Mr. Shaw's evidence was to the effect that it was absolutely essential that any new site for a gas-works should have a railway siding.

Leamington Priors Gas Company.—On Tuesday of last week Dr. Harold Mason (Chairman) presided over the 121st ordinary general meeting of the Company. Dr. Mason, moving the adoption of the report and accounts for the half-year ended June 30, said that the Directors were recommending the payment of the usual dividends, without an increase in the price of gas. It was satisfactory to note that the number of their customers was increasing. Recently they had received the order to supply gas piping and fittings for the first sixty houses on the Corporation housing estate at Rushmore Farm; and the new business which they would obtain would be very helpful.

Glenboig Union Fireclay Company, Ltd.—The report of the Directors to be submitted at the forty-third annual general meeting of the Company next Wednesday (Oct. 21) states that the net profit for the year to Aug. 31, including £4868 brought forward (less Directors' and Auditors' fees), amounts to £31,084. From this the Directors recommend the payment of a dividend at the rate of 20 p.ct., less income-tax at 4s. 3½d. in the pound, which will absorb £23,562, leaving £7521 to be carried forward. During the year the Directors purchased the Glenboig Estate, including the clayfield, for £17,000. The sum of £13,079 has been expended on repairs and renewals for the year, and has been paid out of revenue.

Road Lighting at Tottenham.—The following appeared in the "Tottenham and Edmonton Weekly Herald" for Oct. 9: "Motorists and pedestrians are full of praise for the brilliant lighting by the powerful gas lamps erected on the Great Cambridge Road at the junctions of Southbury Road, Lincoln Road, and Turkey Street. Not only is the road area perfectly illuminated, but, as there are two lights at each junction at a reasonable height, motorists approaching the junctions see all objects strikingly silhouetted between them and the two lights for a considerable distance." The Tottenham District Light, Heat, and Power Company are to be congratulated on the success of their effort to procure better street lighting.

Popularizing Gas at Exeter.—The Directors of the Exeter Gas Company signalized their interest in, and desire to aid, the national campaign on behalf of the British gas industry by holding, at the offices in East Southernhay, a week's exhibition, with the view of showing the public some of the products of the carbonization of coal and many labour-saving appliances for lighting and heating, as well as making better known the big essay competition. The event was the talk of the city, and visitors attended in good numbers. Nothing was taken for granted by the officials in charge of the showrooms—speaking with scrupulous exactness, of course, of the purpose of the appliances. The usefulness of the exhibition cannot be called in question.

The Hereford Gas Committee recommended to the City Council last week that application be made to the Ministry of Health for sanction to borrow £1000 for the purchase of new meters. The recommendation was adopted.

A recent exhibition of gas equipment by the Solihull Gas Company proved very successful. A feature was the furnishing of two rooms by a local tradesman, showing how gas fittings may be made to harmonize with the lay-out of the rooms. A model kitchen containing geyser, wash boiler, cooker, iron, and fire was also noteworthy.

The Education Committee of the London County Council have accepted the following quotations, in accordance with the Council's specification, for improving the gas lighting at a number of the schools under their control: South Metropolitan Gas Company, £1547; Gas Light and Coke Company, £1188; and Commercial Gas Company, £285.

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

Last week opened with a continuation of the good, all-round demand which has been accumulating of late, and many collieries have been able to improve their position considerably. Indeed, the better-class coals are in many instances fully booked for the rest of the month. Naturally this led to a hardening tendency in prices. Whether or not as a result of this, the inquiry, except for best steams, slackened off towards the end of the week. Collieries have, however, been much encouraged by the recent improved tendency, and the confirmation of their views that, at economic prices, we can always hold our own in the world's markets. Unfortunately, there is still the problem how to get costs down without the help of an uneconomic subsidy.

Northumberland steams have been the feature of the market, and have been able to command an enhanced price. Gas coals have been in fair demand. Specials and best qualities were somewhat irregular, quoting round about 16s. 6d. to 16s. 9d. for the former, and 16s. to 16s. 6d. for the latter. Seconds have been improving, and have been 13s. 6d. to 14s. The coking section has also been slightly better, and up to 14s. is asked for some qualities. Best Durham bunkers have also been in good demand, at 15s. to 15s. 6d.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

There is not much change in the trade position throughout the Midlands. The amount of employment in the different mining districts varies according to the class of coal raised. Pits which produce a large proportion of house coal are working four to four-and-a-half days a week, in exceptional cases more. There is a little further scope in the gas coal trade, though not enough to prevent spot lots being offered substantially below the contract rates. The market for industrial fuel shows very little improvement. As stocks laid in during July disappear, consumers are coming on the market for more supplies; but current requirements are disappointingly small, and anything like considerable forward commitments are generally avoided. Slacks and D.S. nuts are not being absorbed *pari passu* with the increase of output, due to the slow expansion of the domestic fuel trade. This reacts on values, some very low prices being named by collieries to whom unimpeded facilities for getting and marketing household coal are more important than the price of smalls.

At the quarterly meeting of the Midland Iron Trade, held at Birmingham last week, the tone was more hopeful. A few fairly large deals were made in pig iron; but blast-furnaces still have a good deal of trouble in disposing of their output. Though the subsidence of selling prices has been arrested, the market is none too steady. A compromise has been reached with regard to blast-furnace coke for Midland smelters. The basis till the end of the year is to be 11s. 9d., a reduction of 9d.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

The fine weather is tending to retard the request, recently on the increase, for household coal, and a degree of uncertainty prevails among merchants as to the policy of contracting over a period which takes in several summer months of next year. This is due, no doubt, to the fact that the Coal Commission's report will be available about April. It is, however, anticipated that in a few weeks collieries will gradually increase their working hours. At present the general average appears to be about four days a week.

The industrial situation does not improve, and the larger consuming centres do not hold out any prospect of being in the market for increased quantities of fuel in the next few months. In many instances, prices, however low, cannot be taken advantage of by reason of accumulated stocks.

Gas coal is moving more freely under contract, and there is not a large surplus of the better classes available for outside sale.

For the more standardized qualities usually exported, the slightly increased activity of the past few weeks is maintained; f.o.b. figures are firm, with an indication that the present situation will continue at all events for a few weeks. The Continental demand is rather better, possibly on account of depleted stocks and the fact of British coals being stronger than those produced abroad and required for the heavier winter work.

Prices at Hull at the week-end (f.o.b. usual shipping ports) were: South Yorkshire.—Hards, Association, 18s. 9d. to 19s.; screened gas coal, 18s. to 19s.; washed trebles, 18s. 9d. to 19s. 6d.; washed doubles, 18s. 6d.; washed singles, 17s. to 17s. 6d.; washed smalls, 13s. 9d. to 14s.; unwashed doubles, 15s. 6d.; rough slack, 9s. 6d. to 10s.; smithy peas, 18s. to 19s. 6d. West Yorkshire: Hartleys, 16s. 9d. to 17s.; screened gas coal, 17s.; washed trebles, 17s.; washed doubles, 17s.; washed singles, 16s.; washed smalls, 12s. to 12s. 9d.; washed trebles, 16s.; unwashed doubles, 12s. 6d. to 13s. 6d.; rough slack, 10s.; coking smalls, 9s. Derbyshire and Nottinghamshire.—Top hards, 19s. 6d. to 21s.; washed trebles, 18s.; washed smalls, 12s. to 12s. 6d.; rough slack, 9s. 6d. to 10s. Yorkshire, Derbyshire, and Nottinghamshire.—Screened steam coal, 16s. to 17s. 6d.; gas coke, 20s. to 23s.; furnace coke, 18s. to 19s. per ton.

Advertising Gas at Colne.—The Colne Corporation know how to advertise gas. In the "Colne and Nelson Times" for Oct. 2 a whole page is taken up by a really excellent set of "educative paragraphs" on the advantages to be derived from the use of gas—advantages which are within the reach of all. The centre of the page referred to is devoted to three short articles which are very much to the point. One is on the magnitude of the gas industry, another, by a woman correspondent, is entitled "The House of Leisure," and the third explains how gas bills can be controlled.

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Ironfounders to
H.M. the King.

An ideal Wash-house Boiler——
"THE CARRONADE"
specially adapted for modern housing requirements.

Casing of cast-iron, with rustless pan of 10 gallons capacity. Hob is made with a fall towards the inside and a vertical ridge at the outside, so that water on the hob must run back into pan. Double concentric ring burner, combined fume and steam outlet nozzle, wooden lid, etc.

No. 6N New Season's Gas Appliance Booklet —a supply may be had with your name—free.

CARRON COMPANY Works: CARRON, STIRLINGSHIRE.
Branch Works—Phœnix Foundry, Sheffield.
Showrooms:—LONDON—15, Upper Thames St., E.C.4, and 50, Berners St., Oxford St., W.1; LIVERPOOL; GLASGOW; EDINBURGH; BRISTOL, etc.

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WE CAN SUPPLY

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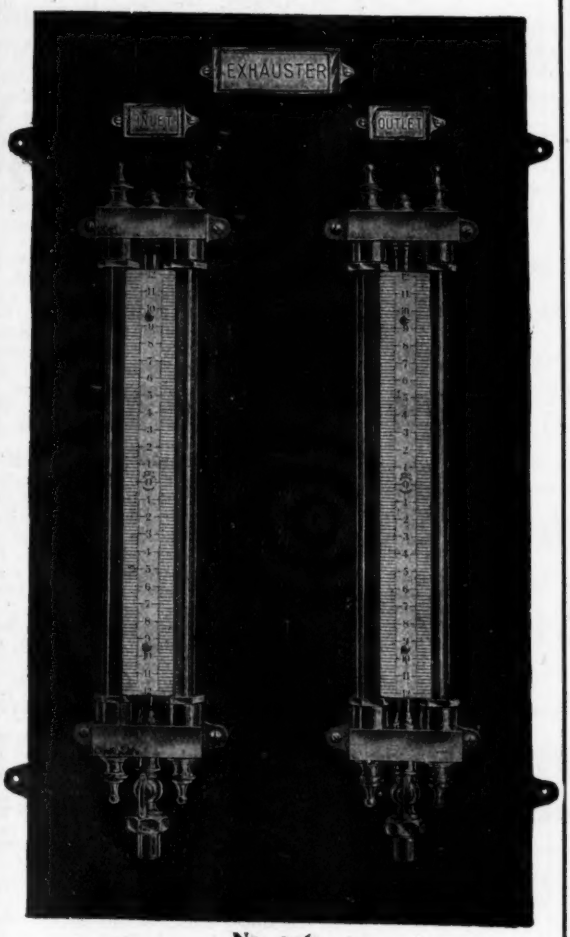

No. 146.

SAWER & PURVES

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Radford Road, NOTTINGHAM.

45 & 47, WESTMINSTER BRIDGE ROAD,

LONDON, S.E.1.

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2025 (Central) Nottingham.
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"Sawer Manchester."
"Sawer Nottingham."
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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *Oct.* 12.

Pitch is perhaps a little quieter, but the price is unchanged at from 41s. 6d. to 42s. 6d. per ton.

Creosote is maintaining its firm tone at from 6¾d. to 7d. per gallon.

Tar spirits continue in demand at the prices last recorded.

Tar Products in the Provinces.

Oct. 12.

Tar products markets generally remain quiet.

Pitch continues firm, but there is little or no business doing; the recent advance in price apparently having had the effect of inducing Continental consumers to defer making further purchases.

There is a good demand for creosote oil, and the outlook is good; the demand being steady both for home and export.

Water-white products are quiet, without any alteration in price.

Other products continue neglected.

The average values for gas-works products during last week were: Gas-works coal-tar, 27s. 9d. to 32s. 9d. Pitch, East Coast, 40s. to 41s. f.o.b. West Coast—Manchester, 34s. 6d. to 35s. 6d.; Liverpool, 35s. 6d. to 36s. 6d. Clyde, 37s. to 39s. Benzole, 90 p.ct., North, 1s. 7½d. to 1s. 8½d.; crude, 65 p.ct., at 120° C., 1s. to 1s. 1d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 7½d. to 1s. 8½d. Toluole, naked, North, 1s. 6½d. to 1s. 7½d., nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8½d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 6d. Heavy naphtha, North, 1s. to 1s. 2d. Creosote, in bulk, North, liquid, 5¾d. to 6d.; salty, 5¾d. to 6d. Scotland, 5¾d. to 5¾d. Heavy oils, in bulk, North, 6½d. to 6¾d. Carbolic acid, 1s. 4d. to 1s. 5d. prompt. Naphthalene, £11 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

TRADE NOTES.

Morris Hand-Operated Overhead Cranes.

Book No. 104 published by Messrs. Herbert Morris, Ltd., of Loughborough, gives an illustrated description of the firm's hand-operated overhead cranes, which shows their adaptability to varied conditions of lift.

The Bowen Instrument Company.

This Leeds firm have published a booklet which describes in detail the construction and principle of their "Pyro" radiation pyrometer for temperatures exceeding 500° C. The firm also supply pyrometers of the resistance type, and the "Wanner" optical instrument.

Messrs. Drakes, Limited.

A new leaflet has been published by Messrs. Drakes, Limited, of Halifax. In this, photographs of horizontal retort settings that have been under fire for long periods constitute authentic evidence of remarkable endurance. One photograph shows a setting of ten retorts, 24 in. by 18 in. by 23 ft. long, erected by the firm in 1915, as let down after working 2660 days under maximum temperature.

CONTRACTS OPEN.

Locomotive Firebox, &c.

The Gas Committee of the Warrington Corporation are inviting tenders for a locomotive firebox, &c., and the re-tyring of locomotive wheels. [See advert. on p. 112.]

Steel Mains.

The Pontypridd Urban District Council are inviting tenders for the supply and delivery of steel mains. [See advert. on p. 112.]

Gas Men and Rifle Shooting.

The small-bore rifle shooting movement is making such enormous strides in popularity that since January last over a hundred new clubs have applied to the Society of Miniature Rifle Clubs for affiliation. This bid for universal suffrage is due primarily to two reasons. First, the movement is patriotic and national, since the knowledge of how to handle a rifle is a useful adjunct in case of emergency. But this is not to be taken that the movement is in any way connected with military intention. Far from it. The underlying intention from which spring the elements of the propositions is to put on a permanent footing a really useful pastime which may be followed all the year round, either indoors or outdoors. Secondly, the principal cause of the spread of the movement is the fact that the Council of the "S.M.R.C." make the sport interesting, not only as far as clubs and associations are concerned, but for the individual rifleman as well. Over a thousand valuable trophies of various kinds, as well as an enormous number of substantial cash prizes, are annually awarded for the best shooting. Good fellowship among the various units of any given industry is one of those economic factors which should not be lost sight of. The formation of a club is simple enough; and those interested should get in touch with the Secretary of the "S.M.R.C.," No. 15, Arundel Street, London, W.C. 2, who will give hints and suggestions as to what to do, and how to do it.

Extensions at Carlisle Gas-Works.—The tender of Messrs. R. & J. Dempster, Ltd., of Manchester, has been accepted by the Carlisle Gas Committee for the erection of a gasholder of 2 million c.ft. capacity; and they have decided to apply to the Ministry of Health for a loan of £36,798 for the scheme.

STOCK MARKET REPORT.

The influence of cheap money continued in evidence on the Stock Exchange during the past week; but while investment stocks were, generally, in good demand, the prices of gilt-edged securities eased-off slightly. New issues are not all meeting with the success anticipated, and the underwriters of the Bradford, Birkenhead, and Walsall combined 4¾ p.ct. stock at 97 expect to be left with a substantial portion of their commitments. On the other hand, Brisbane Tramway Trust 5½ p.ct. stock at 98½ was heavily over-subscribed. Many other important issues are in preparation, and among these is a £2,000,000 loan by the Glasgow Corporation.

Foreign Bonds were stronger, especially the Reconstruction Loans, and Brazilian stocks also improved. French Rentes were an exception, owing doubtless to the failure of the Government to arrive at a settlement of the Franco-American Debt.

In the Industrial Market, Textiles and Tobaccos continued to be most prominent, and a cheerful tone prevailed in this market. Rubber shares responded again to the rise in the price of the commodity, spot quantities of which touched 4s. 1d. per lb.

In the Gas Market the feature of the week was a further rise of 7 points, to 132-137, in the Brighton and Hove "A" stock. This makes an advance of 14 points in a fortnight; but having regard to the return at the present average price, which equals on the past twelve months' dividend £6 17s. 7d. p.ct., it is surprising the advance has been so long delayed. Otherwise there is little to record; and the depression in prices continues.

The following transactions were recorded during the week:

On Monday, Bombay 19s. 6d., Bournemouth 5 p.ct. 12½, 12½, 12¾, Brighton and Hove "A" 130, Croydon maximum dividend 83, Gas Light and Coke 79¼, 79½, 79⅝, 80, 4 p.ct. preference 78, Hastings and St. Leonards 5 p.ct. 93, 93½, 95, 3½ p.ct. converted 73½, 74, Imperial Continental 149, 150, Liverpool 7 p.ct. preference 102 *ex* div., Primitiva 13s., 13s. 1½d., 13s. 3d., 13s. 4½d., 13s. 6d., 13s. 7½d., 13s. 9d., 14s., 14s. 1½d., 14s. 3d., South Metropolitan 91½, South Suburban 5 p.ct. 96, 96½. Supplementary prices, Brighton and Hove 4 p.ct. debenture 76½, 5 p.ct. debenture 97½, 7 p.ct. new debenture 104.

On Tuesday, Aldershot "C" 76¾, Brentford "A" 94⅝, Continental Union 39, Croydon maximum dividend 83½, Gas Light and Coke 79¼, 79½, 79⅝, 80, 80½, 3½ p.ct. maximum 60, 3 p.ct. debenture 60, Liverpool 7 p.ct. preference 102 *ex* div., Montevideo 68½, Primitiva 13s. 6d., 13s. 9d., 13s. 9½d., 13s. 10½d., 14s., 14s. 1½d., 14s. 3d., 14s. 3½d., 14s. 4½d., South Suburban 5 p.ct. 95½, 96½, Tottenham "A" 106. Supplementary prices, Brighton and Hove 7 p.ct. new debenture 105, Colombo Gas and Water 12, 7 p.ct. preference 10½, Hartlepool 5 p.ct. maximum 88, Liverpool 5 p.ct. 81½, 81¾.

On Wednesday, Commercial 4 p.ct. 79½, Continental Union 38½, European 7½, 7⅞, Gas Light and Coke 79¼, 79½, 79⅝, 80, 80¼, 4 p.ct. preference 78½, 79½, Hastings and St. Leonards 5 p.ct. converted 95, Hongkong and China 18½ *ex* div., Imperial Continental 149, Liverpool 7 p.ct. preference 102⅝ *ex* div., Montevideo 68½, Primitiva 13s., 13s. 3d., 13s. 4½d., 13s. 6d., 13s. 7½d., 13s. 10½d., South Metropolitan 91, Southampton 81½, 4 p.ct. debenture 73½, 74, Tottenham "B" 85.

On Thursday, Brentford "B" 95⅛, British 106½, 106⅝, Gas Light and Coke 79⅛, 79⅜, 80, 3½ p.ct. maximum 60½, Imperial Continental 149½, 150, Liverpool 7 p.ct. preference 102⅜, Ottoman 2s. 6d., Primitiva 12s. 1½d., 12s. 3d., 12s. 6d., 12s. 7½d., 12s. 9d., 12s. 10½d., 13s., South Metropolitan 91⅛, Southampton 4 p.ct. debenture 73½, Swansea 7 p.ct. preference 100½, 6½ p.ct. debenture 101, Tottenham "B" 86. Supplementary prices, British, Norwich, 3½ p.ct. mortgage debentures 64⅛, 65½, 65⅝, Wandsworth 3½ p.ct. new 90.

On Friday, Bombay 19s. 4½d., British 107 *ex* div., European 7½, Gas Light and Coke 79½, 80, 80½, 3½ p.ct. maximum 60½, 60¾, 61, Imperial Continental 149, Lea Bridge 5 p.ct. 96, Primitiva 12s. 3d., 12s. 9d., 13s., 13s. 6d., South Metropolitan 90½, 91, 91⅛, Southampton 5 p.ct. maximum 81⅛, Tottenham "B" 85, Wandsworth, Wimbledon 5 p.ct. 100. Supplementary prices, British, Norwich, 3 p.ct. mortgage debentures 54⅛, 55½, Hull 3½ p.ct. mortgage debentures 65½, 64⅜, Cambridge University and Town 5 p.ct. debenture 95⅜, Gas Light and Coke 10 p.ct. bonds 196½.

In the Money Market on Friday the call on the Conversion Loan had no effect on the available supplies of credit; in fact, conditions were easier than on any other day of the week. Lenders reduced their charges gradually from 2½ p.ct. down to as low as 2 p.ct. for overnight balances. The average rate for new "Treasuries" was £3 6s. 5·79d., or nearly ·10d. p.ct. below the previous week's rate.

The excitement in the Foreign Exchange Market at the beginning of the week subsided towards the close; but francs, in spite of some official support, were weak. The rate on Paris closed at 105.15. The Belgian exchange moved with the French, and ultimately closed at 107.15. Italian lire were quoted at 120⅞; while sterling on New York was slightly lower at 4.84$\frac{15}{16}$.

The Silver Market was quiet, and the price slightly down at 32⅜d. per oz. Gold remained unchanged at 84s. 11½d. per oz.

The Bank Rate is 4 p.ct., to which it was reduced from 4½ p.ct. on Oct. 1. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount houses are 2 p.ct. at call and 2¼ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Oct. 9.	Rise + or Fall − on Week.	Transaction Lowest and Highest Prices.
£			%p.a.	%p.a.				
171,978	Stk.	Aug. 13	5	5	Aldershot 5 p.c. max. C.	75—78	..	76¾
295,402	,,	,,	4	4	Do. 4 p.c. Pref.	70—75	+1	..
1,551,868	,,	Oct. 8	6¼	6¼	Alliance & Dublin Ord.	62—67*	−1	..
374,000	,,	July 9	4	4	Dó. 4 p.c. Deb.	60—65	..	..
300,000	£1	May 7	1/7½	1/7½	Bombay, Ltd.	½—1	..	19/4½—19/6
170,000	10	Aug. 13	8½	8½	Bournemouth 5 p.c.	12—13	..	12½—12¾
425,050	10	,,	7	7	Do. B 7 p.c..	12—12½	..	..
150,000	10	,,	6	6	Do. Pref. 6 p.c..	11—12	..	..
50,000	Stk.	June 25	3	3	Do. 3 p.c. Deb..	56—59	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb..	77—80	..	..
992,045	,,	July 9	6⅛	6⅛	Brentford A Con.	93—98	..	94⅝
990,500	,,	,,	6¼	6¼	Do. B New	93—98	..	93½
76,000	,,	,,	5	5	Do. 5 p.c. Pref.	94—97	..	..
306,690	,,	June 11	4	4	Do. 4 p.c. Deb.	76—81	..	..
181,337	,,	,,	6	6	Do. 6 p.c. Rich. Red. Deb.	100—105	..	..
214,740	,,	Aug. 27	12½	12	Brighton & Hove Orig.	166—171	..	..
244,200	,,	,,	9½	9	Do. A Ord.	132—137	+7	130
1,287,500	,,	July 23	5	5	Bristol 5 p.c. max.	89—91a	..	..
855,000	,,	Oct. 8	7	8	British Ord.	102—107*	−3	106½—107
100,000	,,	June 25	7	7	Do. 7 p.c. Pref.	120—125	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	71—76	..	..
100,000	10	May 21	6	8	Cape Town, Ltd.	6¼—7¼	..	..
100,000	10	Apl. 23	4½	4½	Do. 4½ p.c. Pref.	5½—6½	..	..
150,000	Stk.	June 25	4½	4½	Do. 4½ p.c. Deb.	69—74	..	..
626,860	,,	July 23	6	6	Cardiff Con. Ord.	98—101	..	..
237,860	,,	June 25	7½	7½	Do. 7½ p.c. Red. Deb.	101—104	..	..
157,150	,,	Aug. 13	5	5	Chester 5 p.c. Ord.	90—95b	..	..
1,513,280	,,	July 23	5/12/8	5½	Commercial 4 p.c. Cap.	78—83	..	79½
560,000	,,	,,	5⅝	5/3/4	Do. 3½ p.c. Cap.	78—83	..	..
475,000	,,	June 11	3	3	Do. 3 p.c. Deb.	56—59	..	..
800,000	,,	Oct. 8	—	4	Continental Union, Ltd.	35—40*	..	38½—39
200,000	,,	,,	7	7	Do. 7 p.c. Pref.	87—90*	−1	..
660,000	,,	Aug. 13	6½	6½	Croydon sliding scale	96—100	..	..
284,975	,,	,,	5	5	Do. max. div.	81—84	..	83—83½
492,270	,,	Aug. 13	9	6	Derby Con.	107—109c	..	..
55,000	,,	June 25	4	4	Do. Deb.	74—76c	..	..
1,002,180	10	July 23	4	6	European, Ltd.	7—8	..	7½—7⅝
16,460,070	Stk	Aug. 13	5½	5½	Gas Light & Coke 4 p.c. Ord.	79—81	..	79¼—80¼
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	60—63	..	60—61
4,062,235	,,	,,	4	4	Do. 4 p.c. Con. Pref.	77—80	..	78—79½
4,761,930	,,	June 11	3	3	Do. 3 p.c. Con. Deb.	58—61	..	60
130,000	,,	—	10	10	Do. 10 p.c. Bonds	..	..	196½
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Sept. 10	6½	6½	Hastings & St. L. 5 p.c. Conv.	90—95	..	93—95
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	71—76	..	73½—74
70,000	10	Sept. 24	10	10	Hongkong & China, Ltd.	17½—18½	..	18½
86,600	Stk.	Aug. 13	10	10	Hornsey 7 p.c.	132—137	..	..
1,976,000	,,	May 21	10	59	Imperial Continental Cap.	148—151	..	149—150
226,170	,,	Aug. 13	3½	3½	Do. 3½ p.c. Red. Deb.	70—73	..	..
235,242	,,	Aug. 13	6½	6½	Lea Bridge 5 p.c. Ord.	94—99	..	96
2,127,340	,,	Aug. 13	5½	5½	Liverpool 5 p.c. Ord.	82—82½b	−½	81½—82½
600,000	,,	Sept. 24	7	7	Do. 7 p.c. Red. Pref.	101½—103½b	..	102—102½
165,736	,,	Aug. 27	8	9	Maidstone 5 p.c. Cap.	118—128	..	..
63,480	,,	June 25	3	3	Do. 3 p.c. Deb.	55—60	..	..
75,000	5	June 25	3	7	Malta & Mediterranean	4—4½	..	..
541,920	Stk.	June 11	4	4	Montevideo, Ltd.	66—70	+1	68½
2,061,315	,,	Aug. 13	3	3	Newcastle & Gateshead Con.	71½—72d	..	..
300,929	,,	,,	4	4	Do. 4 p.c. Pref..	73½—76½d	..	76
529,705	,,	June 25	3½	3½	Do. 3½ p.c. Deb.	68—69d	..	..
15,000	,,	Aug. 27	12	11½	North Middlesex 10 p.c.	—	..	..
75,940	,,	,,	8⅝	8⅝	Do. 7 p.c.	—	..	..
300,000	Stk.	May 7	9	7	Oriental, Ltd.	100—105	..	..
188,120	,,	June 25	7½	7½	Plym'th & Ston'house 5 p.c.	108—113	..	..
60,000	50	Aug. 27	14	14	Portsea Island B	93—96	..	..
100,000	50	,,	13	13	Do. C	90—95	..	..
2,289,909	£	—	—	—	Primitiva Ord.	12/3—13/3	..	12/11—14/4½
302,600	100	June 2	4	4	Do. 4 p.c. Red. Deb..	78—80	..	..
600,000	Stk.	July 23	4	4	Do. 4 p.c. Red. Deb. 1911	64—66	..	..
193,744	,,	June 25	4	4	Do. B. Aires 4 p.c. Rd. Db.	63—65	..	..
264,496	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	63—65	..	..
150,000	10	Sept. 24	6	6	San Paulo 6 p.c. Pref.	7½—8	..	..
125,000	50	July 1	5	5	Do. 5 p.c. Red. Deb.	42—45	..	..
270,000	Stk.	Aug. 27	5½	5½	Sheffield A	101—102s	..	..
419,968	,,	,,	5½	5½	Do. B	101—102s	..	..
1,047,000	,,	,,	5½	5½	Do. C	101—102s	..	..
90,000	10	June 11	6	4	South African	7—9	..	..
6,609,895	Stk.	Aug. 13	6½	5	South Met. Ord.	90—92	..	90½—91½
1,895,445	,,	July 9	3	3	Do. 3 p.c. Deb.	57—60	..	..
734,000	,,	Sept. 10	6½	6½	Do. 6½ p.c. Red. Deb.	101—103	..	..
91,500	,,	Aug. 13	8½	8½	South Shields Con.	131—133d	..	..
1,127,795	,,	July 23	6½	6½	South Suburban Ord. 5 p.c.	94—97	+1	95½—96½
368,837	,,	June 25	5	5	Do. 5 p.c. Deb.	95—98	..	..
647,740	,,	May 7	5	5	South'mpt'n Ord. 5 p.c. max.	80—83	..	81½—81⅞
121,275	,,	June 25	4	4	Do. 4 p.c. Deb.	70—75	..	73½—74
250,000	,,	Aug. 27	7	7	Swansea 7 p.c. Red. Pref.	100—102	..	100½
200,000	,,	June 25	6½	6½	Do. 6½ p.c. Red. Deb.	101—103	..	101
120,000	,,	July 23	8	7½	Tottenham District A 5 p.c.	105—110	..	106
882,275	,,	,,	6½	5½	Do. B 3½ p.c.	85—90	..	85—86
150,000	,,	July 9	—	28/4	Do. 5½ p.c. Pref.	103—105	..	..
181,255	,,	June 11	4	4	Do. 4 p.c. Deb.	76—79	..	..
258,251	,,	Aug. 27	5	5	Tynemouth Con. and New Uxbridge, Maidenhead, & Wycombe 5 p.c..	69—71d	..	..
197,294	,,	Aug. 27	6½	6½	Do. 5 p.c. pref.	93—98	..	..
88,330	,,	,,	5	5	Do. 3 p.c. Maidenh'd	93—98	..	..
91,800	,,	,,	6½	6½	Wandsworth, Wimbledon, and Epsom—	88—93	..	..
90,000	,,	July 9	9½	8½	Wandsworth A 5 p.c.	125—130	..	..
255,636	,,	,,	7½	7	Do. B 3½ p.ct.	107—112	..	..
392,955	,,	,,	6/9/6	5/19/0	Do. C and New	90—95	..	90
252,000	,,	,,	7⅜	6½	Wimbledon 5 p.ct.	100—105	..	100
98,000	,,	,,	7½	7½	Epsom 5 p.ct.	110—115	..	..
88,416	,,	June 25	3	3	3 p.c. Deb.	56—59	..	..

Quotations at:—*a*,—Bristol, *b*,—Liverpool, *c*,—Nottingham, *d*,—Newcastle, *e*,—Sheffield, * Ex. div.